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ABSTRACT

The manual is the result of several years' effort toward developing a methodology to depict program resources-funding. The guidelines were developed based on a 1975 feasibility study and tested in seven medical colleges. It is hoped that the guidelines will be useful in analyzing the fiscal mechanisms for funding of the individual resources necessary to carry forward each of the major activities of the medical school. Worksheets, a computer program, and computer printouts are used as illustrations. (MSE)

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PROCEDURAL MANUAL AND GUIDELINES FOR DERIVATION OF DATA ON FUNDING MEDICAL SCHOOL PROGRAM RESOURCES

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Division of Operational Studies

ASSOCIATION OF AMERICAN MEDICAL COLLEGES

FINAL REPORT

December 1977

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FOREWORD

By any measure, medical schools and the institutions involved with them in undergraduate and graduate medical education have experienced an explosive growth in the past twenty-five years:

- In numbers of medical schools - 79 in 1950; 85 in 1960; 101 in 1970; 114 in 1975
- In numbers of medical students - 25,103 in 1950; 30,084 in 1960; 37,669 in 1970; 54,074 in 1975
- In numbers of other full-time equivalent students taught by the medical school faculty - 13,500 in 1950; 33,000 in 1960; 53,500 in 1970; 90,000 in 1975
- In numbers of full-time faculty - 10,500 in 1960; 24,700 in 1970; 36,300 in 1975
- In total finances - $86 million in 1950; $371 million in 1960; $1,550 million in 1970; $3,005 million in 1975
- In the search for new biomedical knowledge - the research activities sponsored by Federal agencies and other sources -- $21 million in 1950; $136 million in 1960; $490 million in 1970; $769 million in 1975
- In direct involvement with hospital based health services - in 1960 five percent of the Nation's hospitals, accounting for 14 percent of all hospital beds, were affiliated with medical schools; currently 16 percent of all hospitals with 40 percent of the hospital beds are affiliated with medical schools.

This growth in education, research and community responsibilities has been accompanied by profound changes in the organization and management of the educational institution. Highly complex instrumentalities have necessarily evolved from the more simply organized and less difficult to administer institutions characteristic of the period prior to the fifties - a period of relative stability for the medical education community in terms of size, number, purpose, and fiscal resources.

The Association of American Medical Colleges and the medical schools, therefore, have engaged since the early 1950's in cooperative efforts to develop information helpful, and perhaps essential, for the administration and management of educational institutions in a rapidly changing and evolving environment. The purpose of these efforts is to provide information necessary for analytical self-studies conducted by individual institutions, and for analyses of the aggregate activities of the medical education universe.

In the preface to Augustus Carroll's pioneering study on medical college costs, published in 1958, Dr. Ward Darley then the Executive Director of the Association stated:

> "The capability to develop and report information that will permit the fiscal understanding of the manifold activities of our Nation's teaching medical centers has been, and still is, one of the major problems facing medical education.--
>
> With medicine and with the society that medicine must serve both rapidly growing more complex and difficult to understand, it is essential that education for medicine be kept at the highest possible level of efficiency and effectiveness. That medical education cannot attain this goal without a better understanding of the fiscal aspects of its responsibilities is now generally recognized." [1]

Carroll's work was directed to developing a methodology to derive data on the costs of undergraduate medical school programs in a way that would permit comparisons among institutions. Beginning with this earlier development, AAMC and its medical school constituency have refined, improved, and expanded the means for cost-finding studies to include all the programs of the institution. The Association has published the results of these developments in "Guidelines for Academic Health Center Cost Allocation Studies, Parts 1 and 2."

Cost allocation (or cost finding) studies assist medical schools to establish the costs of individual programs, that is, the dollar value of the resource inputs, both paid for and contributed, that are utilized by the school in each of its major programs.

Cost finding efforts have been salutary in advancing understanding of the multi-faceted activities of medical educational institutions, and the resource inputs necessary for their programs. There remains to be fully explored, however, the equally significant area for analysis of the fiscal mechanisms for the funding of the individual resources necessary to carry forward each of the major activities of the medical school.

In recognition of this need, the Association, with the support of the Bureau of Health Manpower of the Department of Health, Education and Welfare, and the assistance of an Advisory Group, conducted a study at five medical schools of the feasibility of developing a methodology to depict program resources-funding. The result of this feasibility study was published in December, 1975.[2]

Upon completion of the feasibility study, AAMC staff prepared a draft version of a manual of procedures and guidelines for the derivation of resources-funding data. This preliminary set of guidelines was then tested by a group of seven medical educational institutions, four of whom applied the suggested procedures without direct involvement by AAMC staff.

The Manual in its present form is a revision of the earlier version, incorporating recommendations, based upon their experience, of the seven participating institutions, and the helpful and insightful suggestions of the Advisory Group. The Manual will be made available to medical educational institutions for their consideration as a means for extending, and in a sense completing, their cost-finding analysis. As experience with these procedures builds up over time, it is expected that further refinements and improvements in the methodology will result. A similar period of development occurred following the early cost-finding studies.

The Association wishes to acknowledge, with deep appreciation, the time, effort, and cooperation of the staffs of the twelve institutions that participated in various phases of this endeavor, the significant and selfless contributions of the Advisory Group, and the support and interest of the Bureau of Health Manpower, Health Resources Administration, DHEW.

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OBJECTIVE AND UTILITY OF RESOURCES-FUNDING STUDIES

The objective of this Manual is to present a method by which the resource inputs to individual programs can be linked, in dollar terms, with the sources of funds used by the institutions to pay for resources. The methodology distinguishes between direct resource inputs such as faculty, supporting staff, equipment, supplies and services and indirect resource inputs such as general administration, library utilization, plant operation and maintenance, and use of physical facilities.

The application of this Manual would be useful to institutions that wish to conduct detailed investigations of the complex sources of funds supporting their activities.

Detailed resource-financing data would augment the annual data medical schools have developed for many years on the aggregate flows of funds to their institutions, by breaking down these total flows to the individual program level, and linking individual sources of funds to the specific resource utilized by the program.

The procedure proposed in this Manual, however, can be employed only after the school has completed a cost-finding study, such as many medical schools routinely conduct, since it builds upon and is an extension of that activity.

Just as the cost-finding studies have demonstrated their usefulness to individual institutions and to the medical education universe, the logic and utility of extending this analysis into the area of cost-funding will also be recognized. Linking the resource-inputs to funding sources, for instance, provides administrative and managements staffs with a perspective of the differing degrees of dependance, among an institution's organizational units, programs, and resources, on hard and soft money, that is, on funds that are more certain to be available for the next or a forseeable future period, as compared with those that are less certain or are likely to disappear entirely.

Accommodation to change is the hallmark of evolution and growth. The cost-funding perspective, as an aid to and with rational planning, provides additional

capability for an institution to exercise some control over its direction and accommodation to change. And the utility to the institution of this additional tool will be increased by each successive time-period for which the study is conducted.

In a larger sense, however, just as in the situation of the cost-finding studies, the institution will determine for itself how best to utilize the information provided by a resources-financing analysis.

Furthermore, the availability of a comprehensive methodology and set of guidelines should also make possible comparisons among institutions of the results of resources-financing studies. With proper notation and addendum entries, allowances can be made for the necessary departures from the procedures set forth in the Manual because of particular situations at an institution.

Finally, if a sufficiently large number of institutions conduct such studies over time, a comprehensive view may emerge of the complex fiscal arrangements underlying the activities of the medical education universe. Illuminating the financial mechanisms whereby institutions acquire and pay for requisite resources may also increase public understanding of the contemporary medical education scene, thus providing an additional basis for rational policy decisions at National, regional, and local levels.

ADMINISTRATIVE OPTIONS

The procedures presented in this Manual have been developed to reflect the programs, use of resources, and fund sources common to most medical schools. But while close adherence to these procedures would enhance comparability of the results among institutions, it is recognized that departures may be necessary, dictated by an institution's organizational structure, accounting, and data systems, and the methodology used in deriving the underlying cost-allocation information. Furthermore, alternative approaches may be available to the school that would be an improvement over the suggested procedure. The institution should, of course, employ the best means for the compilation of the resources-financing data.

Before the resources-funding phase of the investigation begins, the cost finding study will have provided data on the inputs (measured in dollar terms) of each resource to each program of the medical school. For faculty and other personnel, this will have required a distribution of the effort (time) devoted to individual programs, and the measurement of that effort in dollar terms by relating the effort distribution to the compensation of the faculty member, or other personnel. The costs (actual or imputed) of all other resource inputs will also have been allocated to individual programs, reflecting the utilization by each program of the specific resource and the appropriate proportionate amount of the total cost, actual or imputed, of the resource.

The actual procedure for a resource-funding study will, of course, be governed by the organizational and record-keeping arrangements of the institution conducting the study. The following discussion may, however, be of help in planning for a resources-funding study by outlining the essential data elements and a suggested procedure for the management and conduct of the investigation.

Study Management. In contrast with the cost-finding phase, which will have required the active cooperation of faculty, other personnel, and the direct participation of departmental chairmen, administration, and management staff, the resources-funding phase can be accomplished by a considerably smaller staff effort.

It is essential that one person be designated to direct this phase, the institution's Business or Financial Officer or other official with the requisite knowledge concerning the fiscal operations of the institution. The coordinator of the study will need the assistance of staff who have a working faimilarity with the accounting and other records.

The director of the study will not have to devote full-time to the project, and the number of people assigned, and the work-weeks of their effort, will depend upon the extent to which the necessary detailed data on fund sources are already available in the institution's fiscal accounting records. The point to be emphasized here is that while an institution's accounting system may not have been designed for this particular purpose, it will, in most instances, provide much of the source of fund information needed for this investigation.

Data Management. It is possible to conduct the study and perform all the necessary steps manually. It is recommended, however, that a computer be used as the most expeditious way to handle the data and to perform the necessary computations in the application of the proposed methodology. The nature of these computations lend themselves to machine manipulation. (A computer program developed for this purpose is presented in the Technical Notes to the ASSUMPTIONS AND METHODOLOGY section).

PROCEDURE FOR THE RESOURCES-FUNDING STUDY

The next section of the Manual presents (1) definitions of programs, resources, and funds, (2) a discussion concerning the compilation of the data, relating to these defined items, that are required for the application of the proposed methodology, and (3) through the use of hypothetical examples, an exposition of the application of the methodology, based on the assumptions underlying the cost-funding analysis. A procedure for the application of the methodology through the use of a computer is presented in the accompanying Technical Notes. These notes detail a system for the management of the data by presenting (a) coding schemes for the organizational units common to medical schools (departments of basic and clinical sciences), for the resource inputs, and for sources of funds; (b) suggested forms for the data entering process; (c) a computer program in FORTRAN designed to apply the methodology proposed in this Manual in a form that, with readily made modifications, will be adaptable to a variety of computer figurations; and the documentation of the logic of the program in psuedo-code for those institutions desiring to use a different program language; and (d) test data to assure that the computer program, if modified, will produce the desired methodological results.

A final section of the Manual proposes resolution of areas of coverage and conceptural difficulty inherent in the approach presented in this document for the development of a resources-financing analysis.

DEFINITIONS

Programs - The major individual programs of the medical school for which individual resource inputs and funding sources are to be analyzed are -

1. Education
2. Research
3. Medical service provided by faculty and staff of the medical school
4. Community (public) service
5. Other

The education program is further divided into specific individual programs for -

a. Undergraduate medical education; the program leading to the doctor of medicine degree; including the combined M.D.-Ph.D. program.

b. Graduate medical education; the training programs for interns and residents;

c. Masters and doctoral degree programs for candidates in the basic biological, behavioral, and clinical sciences;

d. Post-doctoral (Ph.D. and M.D.) education programs for careers in research, service, and education;

e. Programs for students in health professions other than medicine... nursing, dentistry, allied health, etc;

f. Continuing medical education programs for physicians in practice and others desiring to keep abreast of advances in medicine;

g. Other education programs for students enrolled in other units of the parent university but who are instructed by medical school faculty;

h. Departmental and Institutional Administration. It is recognized that administration is not an end-purpose program; however, it is necessary for the accomplishment of institutional objectives in education, research, medical, and community service. In order that resource inputs for administration be accounted for, the proposed procedure distributes these inputs proportionately to the activities they support.

Resources-Resource inputs are shown in two major groups - direct and indirect. Direct program inputs are those required to carry forward specific programs, and are, therefore, readily allocated to the program they support. Indirect inputs represent "overhead" requirements for all programs of the school -- e.g., general administration and plant operation and maintenance. Although less readily discernible, program allocation of these indirect

resource inputs is also essential for a resource-financing study, if all the resource requirements are to be accounted for.

The individual resource inputs that are to be measured in dollar terms are -

A. Direct program inputs

1. Faculty
   a. full-time
   b. part-time
2. Supporting staff
   a. secretarial and clerical
   b. technical
   c. other
3. Interns and residents
4. Graduate students
5. Post-doctoral fellows in the basic and clinical sciences
6. Fringe benefits
   a. faculty
   b. other personnel
7. Supplies and services (other than personnel)
8. Equipment
9. Contributed services
   a. volunteer faculty
   b. other

B. Indirect Inputs

1. General administration, i.e., dean's office, student services, business services, etc.
   a. faculty
   b. supporting staff
   c. personnel fringe benefits
      1. faculty
      2. other personnel
   d. supplies and services (other than personnel)
   e. equipment
2. Library
3. Vivarium
4. Plant operation and maintenance (Where the recorded operation and maintenance cost does not cover these expenses for all the space utilized by the programs, imputations should be added for the costs not recorded.)

5. Physical facility utilization
6. Other

Obviously, the largest proportion of total resource inputs are those paid for directly by the medical school, and are therefore included in the fiscal accounts of the school. Also to be included, however, are the inputs to medical school programs where all or part of the resource costs are borne by some other organizational unit of the parent university or by an affiliated activity, such as the medical service plan, or are contributed. Many institutions rely to a significant degree upon the services of volunteer faculty. Obviously, there is no fiscal accounting for the contributions of this unpaid resource to the institution's programs. But since all the resources required for an institution's programs are to be measured, an imputed dollar value must be estimated for the program inputs provided by volunteer faculty.

Imputations will also be necessary to reflect the utilization of the physical facility resource required by each program since there is usually no cost associated with this resource in the fiscal accounting system of the institution.

It is especially important that the study cover all resources - paid for, or contributed by volunteers or other units of the institution. This is so because the cost of these necessary inputs may, in future periods, have to be borne by the medical school, should the volunteer faculty no longer be available, or if the costs now contributed by other parts of the educational institution, become the fiscal responsibility of the school.

The section on REQUIRED DATA ELEMENTS therefore, includes procedures for deriving imputations for these resources not accounted for fiscally, but for which imputations are necessary.

Sources of Funds - Generally, funds made available to the medical school are either -

Restricted by the provider of the fund for the acquisition of resources to be utilized to support a specific program, or programs, or -

Unrestricted - available for the support of any program or programs at the school's discretion.

1. Restricted Funds - -

The specific source of funds is to be linked with the specific program or programs designated for support by the provider of the funds. The individual sources of funds are to be applied to the resources supported, in as much detail as possible, namely -

a. Federal government, by agency
b. State government
c. Local government
d. Philanthropic foundations
e. Voluntary health agencies (such as the American Cancer Society)
f. Gifts from private individuals
g. Medical services
h. Endowment income
i. Use of endowment principal
j. Other sources, identified

This category of funds includes, for example, funds restricted by the provider for the support of research; for teaching and training activities, such as those supported by National Institutes of Health grants for pre- and post- doctoral training, and Federal capitation awards based on the number of enrolled students; and medical and other services provided to community agencies and organizations.

2. Unrestricted (or general) funds are those available to the institution where the use of the funds is not restricted to a specific purpose by the provider of the funds. This category usually includes -

a. Tuition
b. Unrestricted gifts from individuals, industry, voluntary health agencies, etc.
c. Unrestricted endowment income
d. Indirect cost recoveries from grants and contracts, less any charges to the institution's fiscal accounts for the use of physical facilities. This will avoid double-counting since imputations for physical facility utilization should cover the full "cost" of this resource.

e. General appropriations from State and local governments. In situations where the use of some part of the appropriation is designated for the support of a specific program (or programs), that portion of the general appropriation should be treated as a restricted fund.
f. Grants for institutional support.
g. Other sources, identified

3. There may be instances where funds, not restricted by the provider, are administratively restricted by the recipient institution to support resources utilized for a particular program or programs. The analysis of resource-fund linkage will be more pertinent to the institution's situation if these administratively restricted funds are linked to the specific resource inputs and programs intended by the administration. Administratively restricted funds, however, should not be mingled with provider restricted funds.

It is also necessary to include as part of the analysis of resource funding, items to balance those resource inputs to specific programs that are not accounted for fiscally by the medical school or any other organizational unit. As already indicated above in the section on Resources these are:

4. Contributed services ---the dollar value of the input to programs by volunteer faculty, and of the resource inputs provided by other units of the parent organization or outside affiliated institutions. Whatever dollar valuation has been placed on the contributed service as a resource input is balanced by an equal dollar amount with the source of funds, labelled "contributed services:" and

5. Imputations for the use of physical facilities, by program. The imputed dollar amount of the resource input of physical facility is balanced by an equal dollar amount, with the source of funds labelled "imputations".

REQUIRED DATA ELEMENTS

While the purpose of this document is to present a procedure for the derivation of program cost-funding data, it may be helpful to reiterate that a completed

cost-finding study is the necessary first phase of a resources-funding investigation.

There are several approaches for deriving cost-finding data, by program. Many medical education institutions have used the Association of American Medical Colleges published "Guidelines for Academic Health Center Cost Allocation Studies, Parts I and II," which provide a detailed procedure for the derivation of resource costs (inputs) by program, for all programs of the institution.

Another approach, developed by the Institute of Medicine of the National Academy of Sciences, focuses specifically on the resource costs associated with the educational program leading to the doctor of medicine degeee (and similar professional or certificate programs of other health professions schools).

In addition, individual institutions may have created methodologies more appropriate to their situation, or introduced some variation of either the AAMC or IOM methodologies.

Essential to all cost-finding studies, however, is a systematic procedure for the distribution of the effort of the faculty (and other personnel) in carrying forward the institution's programs, and a means for allocating to programs all other resource inputs, direct and indirect. (The DEFINITIONS section of this document lists the individual programs and resource inputs).

Allocation of Resource Inputs

The following discussion based on the AAMC published "Guidelines for Academic Health Center Cost Allocation Studies" illustrates a procedure for deriving the data on resource inputs to programs, the necessary first phase of a cost-finding analysis. With the exception of the physical facility use, by program, the Guidelines cover all resource inputs; a procedure for developing data on this resource input is presented below. As already indicated, other approaches (e.g. IOM) are available for allocating resource inputs to programs. The AAMC Guidelines, however, provide a system for providing a detailed body of data, particularly on the distribution of faculty input to programs, essential for conducting a cost-funding analysis at the most detailed level the

methodology in this document proposes for the most important resource input - the effort of the faculty - to the school's programs (see section on ASSUMPTIONS AND METHODOLOGY below). This is so because the AAMC procedure is based on faculty effort reports covering a full year's activity. This level of detail for the faculty resource is also important because for many institutions the faculty effort distribution will also be the basis for the program allocation of other resource inputs in the absence of specific data on the input of these other resources.

In contrast, the Institute of Medicine approach to cost allocation, based upon a faculty effort report for a sample week of the year, provides an adequate basis only for analysis at a high degree of aggregation; e.g., an aggregate for all basic science departments; an aggregate for all clinical science departments, or an aggregate for the entire institution.

The AAMC Guidelines for cost allocation studies, therefore, are an integral part of this publication. It must be emphasized again, however, that whatever methodology an institution uses, the cost-finding data form the basis for a cost-funding analysis.

> Chapters 2 and 3 pp 11-42 of Part I, and references therein to Part 2 of the AAMC published Guidelines, lay out the steps for measuring the inputs of -
>
> > faculty - including volunteer faculty
> > non-academic and supporting staff, including interns and residents;
> > and the supplies and equipment essential for the programs.

The faculty as a resource input, and the procedures for distributing that effort to programs is the essential part of cost-finding. AAMC Guidelines pp. 20-30, 32-38, and the discussion of the effort reporting form pp. 52-57 outline in detail a procedure for capturing the effort of the faculty for a complete year's activity. This makes possible the development of the cost-funding analysis (based on individual faculty effort) if desired at the departmental level (see ASSUMPTIONS AND METHODOLOGY section).

Voluntary faculty input to programs can be measured following the procedure suggested in the Guidelines on pp. 30-32, and 77-79.

Nonacademic and supporting staff as a resource input are discussed on pp. 14, 52; the input of interns and residents or pp. 38-42; supplies and equipment utilized by programs on pages 14, 15, and 57-60 of the AAMC Guidelines.

Indirect resources inputs are discussed on pp. 15, 16, and 61-63 of the AAMC Guidelines.

Institutions may elect to vary these procedures, using different approaches to the collection of data on faculty effort distributions, for instance, since such variations may be more pertinent to the cost-finding investigation of the particular institution. Many institutions have also used the distribution of faculty input to programs as the basis for allocating other resource inputs where specific input data are not available, since faculty effort is usually the largest single resource input, accounting proportionately for the largest resource cost.

Physical Facilities

The published Guidelines do not detail procedures for establishing imputed resource costs for the use of physical facilities. The following procedures, therefore, are suggested to supplement the cost-finding Guidelines to derive the imputed value of this resource.

For the purpose of this Manual, the term physical facilities means the buildings, equipment [3], and supporting services that form the environment in which the school's activities occur, irrespective of conditions of ownership, and regardless of whether they are closely clustered or dispersed.

The method assumes that the building space committed to a given program is essential to the activity, and that if it were not available it would have to be acquired through construction, lease, or purchase. But this assumption does not deal with the issue of how efficiently the space is utilized.

To obtain a uniform base, the cost of the space used by a program could be represented by the expenditure that the school would have to bear in a given year if it had to replace or recreate the equivalent amount of building space used by that program.

A prerequisite to the application of this method is a facilities inventory that should include at the very least information on the building area, in terms of assignable square feet of each type of space (office, laboratory, classroom, health-services areas, etc.) committed to each program. For programs commingled or sharing the space, the data would be derived through appropriate formulae.

Imputed replacement costs are derived by applying building construction costs prevalent in the region to the amounts of space used for each of the school's major programs. These costs are adjusted to reflect the year for which the study is conducted.

Since major building construction is usually financed over a long time, it is assumed that the school would borrow the entire sum needed for the replacement of the facility at a given annual rate of interest, (say 8 percent per annum), and repay this sum (principal and interest) in a given number of annual installments. This imputed annual cost excludes expenditures for operation and maintenance, which are covered as an indirect resource input.

The detailed instructions, formulae, worksheets, and other reference publications necessary to derive the imputed cost of building space usage in accordance with this manual are described in the next section.

Space Inventory

The procedures and definitions for a facilities inventory described here are taken from the "Higher Education Facilities Inventory and Classification Manual" published by the HEW's Office of Education in 1973 and used as the basis for the facilities surveys conducted periodically by the National Center for Educational Statistics in connection with its series of Higher Education General Information Surveys (HEGIS). The HEW

publication is obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.

The descriptions and definitions for the room-use categories are given in the HEW manual. An expanded room-use list, compatible with the definitions, organizations, and coding structure suggested in the HEW manual but more attuned to medical schools' facilities is presented in Illustration 1. The level of detail displayed in that list may not be needed for the simple inventory system required for this manual, but it is a useful guide to help decide which kinds of rooms to include in the broader space aggregations. (Illustration 1 appears at the end of this section, pp. 20-25.)

The Space Inventory Components

In analyzing the space within a given building, four aggregations of building areas are usually considered: "assignable" areas, "circulation/custodial" area, "mechanical/structural" area, and "gross" area.

Assignable area is the building floor area that can be assigned to an occupant to carry out a program-related function. It is measured in terms of "assignable square feet" (ASF) and it includes floor space that is functionally usable by the occupant.

Circulation/custodial area includes that portion of building floor space that by its nature cannot be assigned to an occupant, but is necessary for general operation of the building, (such as stairs, corridors, public toilets, trash rooms, etc).

The sum of assignable areas and circulation/custodial areas is measured in terms of "net square feet" (NSF).

Mechanical/structural areas are the portions of floor areas taken by structural components of the building, such as columns, walls, partitions, and by mechanical components such as pipe shafts, ducts, etc.

Gross area represents all the floor area included within the outside faces of exterior walls. It is measured in terms of "gross square feet" and it is the sum of assignable areas, circulation/custodial areas, and mechanical/ structural areas.

The data necessary for a facilities inventory sufficient to implement this manual concern the assignable areas used to house the programs which are the object of the cost study.

The inventory should identify:

The building (name or building number)
The room (room number)
The room-use category (see Illustration 1 for a listing of suggested room-use categories)
The ASF area measurements of the room
The organizational unit to which the room is assigned
The program to which the activities conducted in the room are related

For the rooms that are assigned to more than one program, the record should also indicate the percent of use by each program. This can be done by apportioning area measurements on the basis of percent of floor space occupied, or percent of time used by each program, depending on the circumstances.

Derivation of the Imputed Cost of the Facility Resource Input

It is common knowledge that the replacement cost of physical facilities depends on factors that are unique to each structure, such as building design, influence of local building codes, site conditions, etc. This manual does not purport to describe a method for estimating the replacement value of the specific buildings in which the facilities are located, but rather to approximate the amount of annual expenditures that would be required to recreate an equal amount of identical assignable floor area in a new hypothetical building.

The Manual assumes that:

1 The space assigned to programs is used efficiently, and is the kind of space appropriate for the function.
2 The costs of recreating given types of space are based on statistical averages of the construction costs of buildings designed primarily for functions similar to those housed

in the spaces for which replacement costs are sought.

3 Assignable-area measurements are converted to gross - area measurements by utilizing average factors commonly experienced for the types of buildings being considered.

4. Institutions that can derive from their data-bases specific information on the ratio of assignable to gross areas for the buildings in which the facilities are located or that have more accurate information on replacement costs, may wish to utilize that information in deriving the data necessary for computing the imputed facility replacement value.

The procedure proposed in this Manual is as follows:

Step 1 -

Obtain from the facilities inventory the total amount of allocated assignable square feet of space for each of the programs being considered in the study, subdivided according to the following room-use categories listed in Illustration 1. (Illustration 1 appears at the end of this section, pp. 20-25.)

Aggregate (A) = Total of series 100 (Classroom facilities)

Aggregate (B) = Total of series 210, 215, 220, 225, 230, 235 (Teaching Laboratory Facilities)

Aggregate (C) = Total of series 250, 255, (Research Laboratory Facilities)

Aggregate (D) = Total of series 300 (Office Facilities)

Aggregate (E) = Total of series 400 (Study Facilities)

Aggregate (F) = Total of series 530, 531, 532, 535 (Audiovisual, etc. Facilities)

Aggregate (G) = Total of series 570, 575 (Animal Care Facilities)

Aggregate (H) = Total of series 710, 715 (Data Processing Facilities)

Aggregate (I) = Total of series 800 (Health Care Facilities)

Step 2 -

For each of the aggregate (A) through (I), convert from assignable square feet (ASF) to gross quare feet (GSF) by using the following conversion factors, which are very broad averages, useful only for the purpose of imputing the space resource, and which should not be used for any other purposes:

GSF (A) = ASF (A)/.55
GSF (B) = ASF (B)/.50
GSF (C) = ASF (C)/.45
GSF (D) = ASF (D)/.55
GSF (E) = ASF (E)/.70
GSF (F) = ASF (F)/.65
GSF (G) = ASF (G)/.45
GSF (H) = ASF (H)/.65
GSF (I) = ASF (I)/.40

Step 3 -

Multiply each of the aggregates (GSF (A) through GSF (I) by the current average cost (in dollars per gross square foot, as published each year by national Building Costs publishing houses *), of constructing a building designed for functions of the type closest to the ones described for the categories in each of the aggregates. Total the costs for each program and adjust them to include the costs of architectural services (normally not included with the published construction costs).

Step 4 -

Adjust the construction costs obtained in Step 3 to the location of the school (multiply by the city cost index published in the construction cost book for the city closest to your site) and then multiply these results by the historical index (also published in the construction costs books) to reflect the costs prevalent at the time when construction of the hypothetical building might have reached the mid-point of completion. (A good rule of thumb would be one year before the date you are using for your analysis).

Step 5 -

At the completion of Step 4, you will have obtained the probable total cost for the replacement of the building space assigned to each program. Next, this replacement cost must be converted to annual charges.

The proposed methodology assumes that the entire sum for recreating each space would be borrowed at an interest rate of 8% and repaid in equal annual installments over a fifty-year period. Institutions could choose a different set of assumptions for the amount of interest and/or the repayment period.

To derive the annual repayment value, multiply the total cost obtained at the end of Step 4 by .0817 [5].

The results at the completion of Step 5 represent the imputed value of the physical facilities resource and the inputed cost of the space used for each program.

Please note that the method outlined above does not take into account the value of the land. The development of a uniform formula for its inclusion is not readily feasible in the absence of standardized records and vagaries of the land-market situation reflecting the physical characteristics of building sites. Efforts to refine the space formula to reflect the land use value, however, would probably not result in a substantially more accurate imputed cost for this resource use. For this reason, consideration of the land-use value is not relevant to the process of resources flow to programs. The imputed costs of campus-wide services, of scientific equipment, of furniture, and the costs of facilities operation and maintenance should be calculated, and are included with the supplies and equipment and operation and maintenance resource inputs.

For space which is leased the rental cost should not be included in other resource inputs if the leased space is to be included with the space inventory and its cost imputed accordingly. Conversely, if it is desired to use the rental cost as the replacement value for the leased space, then the value of this rent should be used in place of that derived through the imputation process for the leased space.

Suggested worksheets for the derivation of the data are shown in Illustrations 2 and 3. (Illustrations 2 and 3 appear at the end of this section, pp. 26, 27.)

Illustration 1

Room-Use Categories for Facilities Inventory Data

100 CLASSROOM FACILITIES
- 110 Classroom (scheduled)
- 115 Classroom Service
- 120 Classroom/Conference (unscheduled)

200 LABORATORY FACILITIES
- 210 Class Laboratory
  - 210.1 Dry Laboratory
  - 210.2 Wet Laboratory
  - 210.3 Open Laboratory
  - 210.4 Special Laboratory
  - 210.5 Stand-up Laboratory
  - 210.6 Sit-down Laboratory
  - 210.7 Student home-base laboratory
  - 210.8 Multi-use Laboratory
  - 210.9 Other
- 215 Class Laboratory Service
  - 215.1 Media and reagent preparation
  - 215.2 Stock and dispensing
  - 215.3 Glass washing
  - 215.4 Tissue preparation
  - 215.5 Darkroom
  - 215.6 Animal rooms serving labs directly (may include acute holding)
  - 215.7 Environmental (hot, cold, clean, etc.)
  - 215.8 -
  - 215.9 Other
- 220 Special Class Laboratory
- 225 Special Class Laboratory Service
- 230 Individual Study Laboratory
- 235 Individual Study Laboratory Service
- 250 Nonclass Laboratory
- 255 Nonclass Laboratory Service
  - 255.1 Media and reagent preparation
  - 255.2 Stock and dispensing
  - 255.3 Glass washing
  - 255.4 Tissue preparation
  - 255.5 Darkroom
  - 255.6 Animal rooms serving labs directly (may include acute holding)
  - 255.7 Environmental
  - 255.8 Storage
  - 255.9 Other

300 OFFICE FACILITIES

310 Office
- 310.1 Faculty
- 310.2 Students (including home-based areas)
- 310.3 Non-faculty, professional and technical
- 310.4 Administrative, management
- 310.5 Secretarial
- 310.6 Clerical
- 310.7 -
- 310.8 -
- 310.9 Other

315 Office Service
- 315.1 Faculty
- 315.2 Students (including home-based)
- 315.3 Non-faculty professional
- 315.4 Administative, management
- 315.5 Secretarial
- 315.6 Clerical
- 315.7 -
- 315.8 -
- 315.9 Other

350 Conference Room (Office related)

355 Conference Room Service (Office related)

400 STUDY FACILITIES

410 Reading/Study Room
420 Stack
430 Open-Stack Reading Room
440 Processing Room
455 Study Service

500 SPECIAL-USE FACILITIES

510 Armory
515 Armory Service
520 Athletic/Physical Education
523 Athletic Facilities Spectator Seating
525 Athletic/Physical Education Service
530 Audiovisual, Radio, TV
- 531 Graphics/Illustration
- 532 Photography Facilities

535 Audiovisual, Radio, TV Service
540 Clinic (Nonhealth Professions)
550 Demonstration
555 Demonstration Service
560 Field Building
570 Animal Quarters
575 Animal Quarters Service
580 Greenhouse
585 Greenhouse Service
590 Other

600 GENERAL USE FACILITIES
- 610 Assembly
- 615 Assembly Service
- 620 Exhibition
- 625 Exhibition Service
- 630 Food Facilities (eating)
- 635 Food Facilities Service
- 650 Lounge
- 655 Lounge Service
- 660 Merchandising Facilities
  - 661 Vending/Concession
- 665 Merchandising Facilities Service
- 670 Recreation
- 675 Recreation Service
- 680 Meeting Room
- 685 Meeting Room Service
- 690 Locker

700 SUPPORTING FACILITIES
- 710 Data Processing/Computer
- 715 Data Processing/Computer Service
- 720 Shop
  - 721 Central Duplicating/Printing
- 725 Shop Service
- 730 Centralized Storage
- 735 Centralized Storage Service
- 740 Vehicle Storage Facility
- 745 Vehicle Storage Facility Service
- 750 Central Food Stores
- 760 Central Laundry
- 770 Central Stockroom

800 HEALTH-CARE FACILITIES
- 810 Patient Bedroom
  - 811 Intensive
    - 811.1 Regular
    - 811.2 Isolation
  - 812 Acute
  - 813 Intermediate
  - 814 Extended
  - 815 Minimal
  - 816 Special
  - 817 Nursery
  - 818 Labor
- 820 Patient Bath
  - 821 Serving patient bedroom - connected
  - 822 Serving patient bedroom - not connected
  - 823 Serving diagnostic/treatment areas
  - 824 Special

830 Nurse Station
- 831 Nurse Station
- 832 Medication Room
- 833 Charting area/Conference Room
- 834 Utility Room
  - 834.1 Clean
  - 834.2 Soiled
- 835 Service space, Storage
- 836 Special

840 Surgery
- 841 Major, general
- 842 Major, special
- 843 Minor, special procedures
- 844 Delivery

845 845 Service (Scrub/locker/gowning/sterile corridor)
- 846 Service space/Storage
- 847 Recovery
- 848 Special
- 849 Induction/preparation

850 Treatment
- 851 Treatment/Examination/Diagnostic - General
- 853 Specialized examining,physiological functions (blood gas, pulmonary, renal. Include radioisotopes, fluroscopy, scanning, radiological, EKG, ECG.)
- 854 Specialized Treatment (including Tank, Speech Therapy, Gait train, Dayroom)
- 855 Treatment/Examination/Diagnostic - Service
  - 855.1 Media and reagent preparation
  - 855.2 Stock and dispensing
  - 855.3 Glass washing
  - 855.4 Tissue preparation
  - 855.5 Darkroom
  - 855.6 Animal rooms serving labs directly (include acute hold)
  - 955.7 Environmental (hot, cold, clean, etc.)
  - 855.8 Storage
  - 855.9 Other

- 856 Rehabilitative Services
  - 856.1 Exercise, special
  - 856.2 Model training, home life
  - 856.3 Dayroom
  - 856.4 Arts and Crafts
  - 856.5 Vocational Training

- 857 Patient Education

860 Service Laboratory
- 861 Diagnostic Laboratory
  - 861.1 Specimen collection
  - 861.2 Chemistry
  - 861.3 Immunologic
  - 861.4 Counting (Hematologic, Bone marrow)
  - 861.5 Identification (Micro.,Virol., Parasit.)
  - 861.6 Genetics
  - 861.7 Tissue microscopy
- 862 Autopsy/Morgue
- 863 Blood Bank
- 864 Organ Tissue Bank
- 865 Laboratory Services
  - 865.1 Media and reagent preparation
  - 865.2 Stock and dispensing
  - 865.3 Glass washing
  - 865.4 Tissue preparation
  - 865.5 Darkroom
  - 865.6 Animal rooms serv. labs. dir.(incl. acute hold)
  - 865.7 Environmental (hot, cold,clean,etc.)
  - 865.8 -
  - 865.9 Other
- 866 Prosthetic Labs
- 867 Monitoring
  - 867.1 Infection
  - 867.2 Radiation
  - 867.3 Mech./Electr.

870 Supplies
- 871 Receiving
- 872 Storage
  - 872.1 General, (Bulk, active)
  - 872.2 Temp. controlled, (cold,warm,frozen)
  - 872.3 Sterile
  - 872.4 Hazardous (Solvent, Reagent, Radioactive, Explosive)
  - 872.5 Secure (Alcohol,Drugs, Narcotics)
  - 872.6 Cylinders
- 873 Processing
  - 873.1 Receiving
  - 873.2 Cleaning
  - 873.3 Sort and assemble
  - 874.4 Sterilization
  - 874.5 Containerize
- 874 Dispensing
- 875 Service - (Cart, cleaning,etc.)
- 876 Preparation of drugs, fluids, admixtures
- 877 Dispensing of drugs, fluids, administures-

880 Waiting
- 881 Waiting/lobby/visiting (Public)
- 882 Information/Reception (Public)
- 883 Interview/Registration (Patient)
- 884 Quiet/Meditation
- 885 Service/Storage
- 886 Child Care (Supervision)
- 887 Waiting Room for Patients

890 Health Care Support
- 891 Staff convenience areas
  - 891.1 Oncall rooms
  - 891.2 Staff lounges, restricted
  - 891.3 Locker/Dressing, toilets
  - 891.4 Toilets, restricted
  - 891.5 Service to staff conv. areas

89 892 Medical Records
- 892.1 Processing
- 892.2 Service space; Storage

895 Health Care Services

900 RESIDENTIAL FACILITIES

910 Sleep/Study without Toilet/Bath
919 Toilet/Bath
920 Sleep/Study with Toilet/Bath
935 Sleep/Study Service
950 Apartment
- 951 Guest Quarters

955 Apartment Service
970 House

Illustration 2

Worksheet: Computation of Facilities Replacement Cost - By Program - Based on Current National Average Construction Costs

Program: _____ Program Code: _____

Prepared by: _____ Date: _____

Aggregates by Room-Use Categories	Step 1		Step 2		Step 3	Notes
	ASF allocated to prog.	Conversion factor ASF to GSF	Equivalent GSF	Average unit costs of constr. $/GSF	Average cost for constr. Equiv. Area	
(A) Classrooms - Code 100		.55				
(B) Teaching Laboratories - Code 210, 215, 220, 225, 230, 235		.50				
(C) Research Laboratories Code 250, 255		.45				
(D) Office Space Code 300		.55				
(E) Study Space Code 400		.70				
(F) Audio Visual Code 530, 531, 532, 535		.65				
(G) Animal Care Code 570, 575		.45				
(H) Data Processing Code 710, 715		.65				
(I) Health Care Code 800		.40				
Other (as applicable)						
TOTALS						

Illustration 3

Worksheet: Computation of the imputed replacement cost for the facilities used by each program.

Prepared by: _____ **Date:** _____

PROGRAM	Totals from Step 3	Adjusted for Arch. fees	Index for location and time	Step 4: Cost converted to location and time	Capital Recovery Factor	Step 5: Imputed replacement value
Education						
(a) U.G. Medical						
(b) Grad. Medical						
(c) M.S. Ph.D.						
(d) Post-doctoral						
(e) Other Health Prof.						
(f) Cont. Educ.						
(g) Other Educ.						
Education Total						
Research						
Medical Service						
Community Service						
Other						
TOTAL						

Linking Fund Sources to Resources

A suggested step-by-step procedure for conducting the cost-finding phase is presented in Chapter 4, pp 43-81 of the published Guidelines. A detailed procedure is particularly important for this phase because the collection of the resource input data requires the full cooperation of the faculty and other staff with the coordinator and staff participants of the study. Effective control of the procedures, fully informing all personnel of the institution, and assembling a staff adequate for the conduct of the study, are essential. This phase is probably the most crucial one to the success of the entire study, since so much depends upon the willingness of the school's personnel to report their input (effort) to the programs of the school.

The second phase of the investigation -- namely tracing the mechanisms for funding the individual resource inputs, requires little or no data to be supplied directly by faculty or other personnel. Instead, the available fiscal records of the institution are the principal sources that are relied upon. Since this is so, staff who are knowledgeable in this area will be directly involved in developing the data for the second phase -- a number considerably fewer and a staff effort considerably less than that required for phase one. It is essential, however, that the director and staff responsible for the phase one cost-finding study be consulted as the second phase progresses, to avoid misinterpretations of the phase one data, and to assure continuity and uniformity for both phases of the endeavor.

The cost-finding study will have established the total cost including contributed services and imputations for resource costs not accounted for fiscally. The cost-finding study will also have allocated to each individual program its share of the total cost of each resource necessary for the program. This will have been derived by applying the individual program's share (percent) of the total resource input (to all programs) to the total cost of that resource.

The data elements necessary for phase two -- the resources-funding investigation -- are breakdowns of the individual resource cost allocated to each program to show the individual source (or sources) that have provided the funds to pay for the input of that resource. The Technical Notes to the ASSUMPTIONS AND METHODOLOGY

section present detailed coding schemes for handling the data elements necessary for the resources-funding phase; these codes cover the resources and fund sources identified in the section on DEFINITIONS.

The breakdowns should be in as much detail as the accounting system of the institution provides. For funds restricted to specific programs, the information readily available will usually be adequate to link the support provided to individual resources. For example, funds received from research grants or contracts will be recorded in sufficient detail to show the use of the funds by program, and the individual resource inputs utilized in carrying forward the activity sponsored by the provider of the funds. This will be adequately shown where the institution follows the accounting procedures published by the National Association of College and University Business Officers in "College and University Business Administration", 1974.

The general fund category is made up of individual funds from many different sources -- such as tuition, unrestricted gifts, appropriations from state governments. The allocation process, however, treats all of these individual sources as one fund to cover resource inputs not funded by restricted purpose funds. For analytical purposes it is helpful to have a percentage breakdown of the aggregate general fund to show the individual component funds making up the general fund.

ASSUMPTIONS AND METHODOLOGY

The principal assumptions underlying the proposed resources-funding investigation is that funds restricted by the provider to a specific purpose (program) pay for the acquisition of resources utilized by the institution in accomplishing that purpose. Funds that are not restricted by the provider, but that are administratively restricted for the support of particular programs are also to be linked to the resource inputs for the programs specified by the administration. As a corollary, unrestricted funds pay for resources utilized in carrying forward programs or portions of programs that are not provided for by restricted funds.

The proposed methodology builds upon this assumption. The necessary first-step, a completed cost-finding study will have provided data on individual resource inputs to each program. The resources-funding phase goes further by focusing upon the sources of funds drawn upon by the institution to provide the resource inputs. As already discussed, detailed information on the use of restricted funds should be readily available in the institution's accounting system, but special effort may be necessary to trace the linkage between specific unrestricted funds and the individual resource inputs to programs.

In the following discussion the term "general funds" is used to illustrate the application of the proposed methodology to all unrestricted funds. In actual practice, and to the extent data are available, however, the methodology would be applied to show the support for specific resource inputs by specific unrestricted funds.

Application of Proposed Methodology

The following discussion and the accompanying illustrative material describe the application of the proposed methodology. Hypothetical examples have been selected to indicate how funding mechanisms can be linked to resources. While the basic assumption underlying the proposed methodology is a simple one, and can be clearly enunciated, the means for its execution may appear to be complicated, and the illustrative material may require more careful study.

It must be emphasized again, that the methodology may need to be modified in its application to satisfy particular conditions and institutional needs, and if necessary, to conform with previously established allocation and funding procedures of the institution.

1. Let us assume that resource A (which can stand for any resource - faculty, supporting staff, supplies, etc.) is utilized by the school as shown in illustration 4.

Illustration 4

		Programs			
	Total Input	Undergrad Med. Educ.	Post-doc. education	Research	Admin.
Resource A	$30,000	$6,000	$9,000	$13,500	$1,500

The sources of funds supporting this $30,000 resource input are:

Research grant - $10,000

Training grant for post-doctoral education - $5,000

General funds available to the institution - $15,000

The methodology calls for first allocating the $10,000 research grant to the $13,500 input of resource A to the research program, and the $5,000 training grant for post-doctoral education to the $9,000 input of this resource to this program. The situation up to this point is shown in Illustration 5.

Illustration 5

	Programs				
	Total Input	Undergrad Med. Educ.	Post-doc. education	Research	Admin.
Resource A	$30,000	$6,000	$9,000	$13,500	$1,500
Less restricted funds:					
Research Grants	10,000			10,000	
Training Grants	5,000		5,000		
Unfunded Input	$15,000	$6,000	$4,000	$ 3,500	$1,500

This unfunded input -- a total of $15,000, in this case is paid for by the general funds of the institution:

Illustration 6

	Programs				
	Total	Undergrad. Med. Educ.	Post-doc. education	Research	Admin.
Unfunded input	$15,000	$6,000	$4,000	$3,500	$1,500
General funds	$15,000	$6,000	$4,000	$3,500	$1,500

In short, funds that do not carry with them a stipulated or explicit intent are allocated after all stipulated funds have been exhausted to cover the resource inputs required to carry forward the programs for which the restricted funds have been made available.

The allocation process requires that if there are any residual funds in excess of the amounts required to acquire the resource inputs for the intended program, such residual funds are allocated to other programs not fully funded, except for funds provided to support a program in education. In this latter situation, residual education program funds should first be allocated to support any unfunded resource utilized for other education programs, in proportion to the unfunded resource inputs for these other educational programs. A hypothetical example is shown in illustration 7.

Illustration 7

		Programs				
	Total Input	Undergrad Med. Educ.	Grad Med. Educ.	Post-doc Educ.	Research	Admin.
Resource A	$10,000	$2,000	$1,000	$2,000	$4,000	$1,000
Sources of funds allocation, proposed methodology:						
Research grant	4,000				4,000	
Post-doc training grant	4,000	1,333	667	2,000		
General funds	2,000	667	333			1,000
Total Allocation		$2,000	$1,000	$2,000	$4,000	$1,000

If instead of the proposed methodology for the treatment of excess educational funds, the excess of post-doctoral training grant funds in this hypothetical example were treated as a general fund, a different pattern of allocation of funds results, as shown in illustration 8.

Illustration 8

		Programs				
	Total Input	Undergrad Med. Educ.	Grad Med. Educ.	Post-doc Educ.	Research	Admin.
Resource A	$10,000	$2,000	$1,000	$2,000	$4,000	$1,000
Sources of funds allocation:						
Research grant	4,000				4,000	
Post-doc training grant	4,000			2,000		
General funds plus residual post-doc training grant	2,000 / 4,000 / 2,000	1,000 / 1,000	500 / 500			500 / 500
Total Allocation		$2,000	$1,000	$2,000	$4,000	$1,000

2. The methodology can be applied at different levels of aggregation.

a. Each resource input can be treated individually, e.g. faculty as a resource input, providing the underlying cost-finding data are sufficiently detailed on an individual faculty member basis; see REQUIRED DATA ELEMENTS section, particularly the discussion on Allocation of Resource Inputs.

Relevant data for each faculty member's input to specific programs would be linked to the specific source of that faculty member's total compensation, or

b. Each resource input can be treated at the institution's department or division level by aggregating the inputs of the resource, e.g. all faculty, to the programs of the department, and linking these program input aggregates to all sources of funds for the total compensation of all faculty in that department.

Department totals can also be obtained by summing the individual resource-funding allocations under the procedure summarized above in paragraph 2a.

From both procedures - (paragraphs 2a and 2b) higher levels of aggregation can be derived by summing departments of the basic sciences, departments of the clinical sciences, and for all departments of the institution.

Thus the methodology can be applied at different levels of detail - by individual resource input, or by departments (or divisions) of the institution. Managerial needs may be best accomplished by either one or by both approaches. For instance, the aggregate approach may be more pertinent for an evaluation of the degree of reliance upon outside sources for the funding of each of the programs of an entire department or division. Aggregate data may also reflect more realistically management decisions concerning resource allocation and funding for individual departments and/or divisions. The individual resource input approach, on the other hand, provides the specific information necessary to pinpoint the department's programs that would be affected if an individual resource would not be available should changes in the funding sources for that resource occur. It should be observed, however, that considerably different results may be obtained when each individual resource input is analyzed from the results obtained when the methodology is applied to department aggregates of the resource input.

The differing results may be illustrated by the following hypothethical situation.

3. Let us assume that the total faculty input to the programs of a three-member faculty department are shown in Illustration 9.

Illustration 9
(In thousands of dollars)

Faculty Member	Total Compensation	Programs				
		Undergrad. Med. Educ.	Postdoc. Educ.	Research	Med. Serv.	Comm. Serv.
A	$20	$5	$5	$5	$5	
B	30		6	12	3	$9
C	40	4	12	8	16	
Total Dept.	$90	$9	$23	$25	$24	$9

The sources of compensation for each faculty member, again in thousands of dollars, are as follows:

Faculty member			
A	Total		$20
	Post-doctoral training grant	$2	
	General funds of the institution	$18	
B	Total		$30
	Postdoctoral training grant	$4	
	General funds	$10	
	Research grant	$10	
	Medical service income	$6	
C	Total		$40
	Postdoctoral training grant	$2	
	General funds	$3	
	Research grants	$10	
	Medical service	$25	

Taking each faculty member and allocating his source of compensation to the programs in which he is engaged, following the methodological procedure outlined above, yields the results shown in Illustration 10.

Illustration 10

(Thousands of Dollars)

FACULTY MEMBER		Programs				
		Undergrad. Med. Educ.	Postdoc. Educ.	Research	Medical Service	Community Service
A - Program Involvement		5	5	5	5	
Compensation						
Postdoc. Trng. Grants (2)			2			
General Funds (18)		5	3	5	5	
B - Program Involvement			6	12	3	9
Compensation						
Postdoc. Trng. Grants (4)			4			
Research Grant (10)				10		
Medical Serv. Income (6)					3	
General Funds (10)	13		1.5	1.5		7
Plus Residual Medical service income (3)			.5	.5		2
			2	2		9
C - Program Involvement		4	12	8	16	
Compensation						
Postdoc. Trng. Grant (2)			2			
Research Grants (10)				8		
Medical Service (25)					16	
General Funds (3)	14	.9	2.1			
Plus residual research grants (2)		.5	1.5			
Medical Service (9)		2.6	6.4			
		4	10			

NOTE: For faculty members B and C, the general funds and the residuals of restricted fund income supporting these faculty members have been allocated proportionately to the programs with unfunded balances.

The result obtained for this hypothetical department, by summing the source of funds allocations for the individual faculty members A, B, and C, is shown in Illustration 11.

Illustration 11

(Thousands of Dollars)

		Programs				
	Total	Undergrad. Med. Educ.	Postdoc. Educ.	Research	Medical Service	Community Service
Total Dept. Prog.	$90	$9	$23	$25	$24	$9
Postdoc. trng. grnts.	8		8			
Research grants	20	.5	1.5	18		
Medical Service	31	2.6	6.9	.5	19	2
General funds	31	5.9	6.6	6.5	5	7

If the allocation methodology, taking total departmental sources of funds, is applied to the aggregate faculty effort distribution, a different pattern results (Illustration 12).

Illustration 12

(Thousands of Dollars)

		Programs				
	Total	Undergrad. Med. Educ.	Postdoc. Educ.	Research	Medical Service	Community Service
Total Department Programs	$90	$9	$23	$25	$24	$9
Post-doc training grants	8		8			
Research grants	20			20		
Medical service	31				24	
Programs to be funded		9	15	5		9
General funds plus medical services 38	31	7.3	12.2	4.1		7.4
	7	1.7	2.8	.9		1.6

The methodology outlined above for the faculty resource is applied to the other resource inputs, in as appropriate detail as the situation at each institution warrants. As already indicated, the Technical Notes provide a procedure for computer application of the methodology illustrated above.

TECHNICAL NOTES
COMPUTER APPLICATION

The computer program developed to apply the methodology to data on resources and funding sources is written in ANSI FORTRAN, and can be run on almost any commercially available computer. Because it was anticipated that medical schools using the methodology may need to modify the program to meet their needs, the computer program follows structured programming techniques. In addition, a header comment section is included with each module describing the functions performed.

To prepare the information for key-punching and machine processing the data on resource inputs to programs and the sources of funds linked with the resource input must be coded. Since the results of the methodology will be most meaningful when summary information is provided for each department of the institution, departmental codes are necessary.

It is recognized that modifications of the suggested code schemes herein presented may be necessary to meet the particular requirements of the institution. The data coding structure, however, has been chosen to correctly classify the data while simplifying the program logic. Modification to the code schemes should maintain the same structure.

Coding Structure

Departmental codes are presented in Illustration 13. Separate codes are provided for institution wide departments, basic science departments, and clinical science departments. Additional codes may be added, but all the codes for institution wide departments must be less than the smallest basic science department code, and the codes for all basic science departments must be less than the smaller clinical science department code.

Resource codes are presented in Illustration 14. Fifteen resource inputs (faculty, supporting staff, supplies, etc.) are provided in this coding scheme. Additional resource

inputs may be added. In addition, the institution must identify, by a specific number, each individual resource. This identifier is necessary in order to link the specific resource with the sources of funds used to acquire the resource. As indicated in the following discussion of the layout of the input data card, this same identification number is to be entered in the cards carrying the data on the input of the specific individual resource to programs (type 2 and 3 cards) and the sources of funds for that resource (type 4 cards).

Sources of funds codes are presented in Illustration 15. These codes are structured to reflect any restriction placed upon the use of a fund by the provider of the fund, or by administrative decision, as well as the specific source of the fund, such as research grant provided by the Federal government, private gift for training of doctoral candidates in psychiatry, and so on. The first two digits of the four-digit decimal code indicate the restriction, while the last two digits indicate the source of fund. Funds in the 1400 series, available for use at the discretion of the institution, are general funds, but the identification of the source of the general funds is provided for in the coding scheme.

Programs do not have to be explicitly coded. This is so because each individual program is assigned a specific field on the cards which carry the information on the resource inputs (faculty, supporting staff, etc.) to each program. This is further explained in the discussion below, on the layout of the input data card.

Input card layout

The use of coding forms following the input data card layout is recommended.

There are five types of cards; Illustration 16. The input data deck formed of these cards can be correctly ordered for the computer run by sorting card columns 1 - 10 in ascending sequence.

The Type 0 card is used to establish certain parameters in the program. The sum of the number of resources (columns 11-12) and the number of sources of funds (columns 13-14) must equal the number of type 1 cards, which provide labels for output. The number of medical education programs is entered in columns 15-16. The lowest code used for a basic science department is entered in columns 17-18, and the lowest code for a clinical science department is entered in columns 19-20.

A Type 1 card is necessary for each resource input, and for each source of funds. The resources code or source of funds code is entered in columns 11-14; the resource name or source of funds series name in columns 15-26.

The Type 2 and 3 cards provide the inputs of each resource to the individual programs.

The Type 2 card provides for inputs of up to 6 programs by a resource ; the type 3 card is necessary where the resource has input to more than 6 programs. (Should there be instances where a resource has input to more than 12 programs, modifications are necessary in the computer program).

For both types 2, 3 and 4 cards, columns 1-9 are the same:

Columns 1-2 department code

Columns 3-4 resource code

Columns 5-9 resource identification number, to be supplied by the institution. (This same identification number must also be entered in column 5-9 of the type 3 and 4 cards so that the input of the individual resource to specific programs can be linked to the specific fund sources for that resource).

Type 2 card - resource input

Column 10 the identifier 2, indicating a Type 2 card.

Columns 11-14 blank

Columns 15-22 Total dollars for the resource

Column 23 identifier 1 if the input of the resource is in percentage form; otherwise no entry. (Computer converts percentages to dollar terms)

Columns 24-31 input of the resource to program 1-Undergraduate medical education

Columns 32-39 input to program 2--Graduate medical education

Columns 40-47 input to program 3--Postdoctoral education

Columns 48-55 input to program 4--M.S. and Ph.D. education

Columns 56-63 input to program 5-Continuing medical education

Columns 64-71 input to program 6--other health education

Type 3 card - resource input

Columns 1-9 same as type 2

Columns 10- the identifier 3, indicating a Type 3 card.

Columns 11-23 blank

Columns 24-31 input to program 7--other health education

Columns 32-39 input to program 8--general education

Columns 40-47 input to program 9--research

Columns 48-55 input to program 10--patient care

Columns 56-63 input to program 11--Community service

Columns 64-71 input to program 12--other

Type 4 card - source of funds for each resource; there is one type 4 card for each source of funds:

Columns 1-9 same as type 2 and 3 cards

Column 10 the identifier 4, indicating a type 4 card

Columns 11-14 source of funds code

Column 15 blank

Columns 16-23 dollar amount of the fund

Type 5 card signals the end of the processing

Columns 1-10 9999999995

The computer program for the application of the methodology is presented in pages 49-60. The application of the methodology, using this computer program has been applied to a set of test data (Illustration 17). The results of the application of the methodology to these data are shown in the computer report pages 64-75.

It is suggested that if modifications of the computer program are necessary, the modified computer program can be tested using these data to assure comparability of the results.

Illustration 13

Medical School Departments

Basic Sciences

Code	Department
10	Anatomy
11	Biochemistry
12	Biological Chemistry
13	Biometry
14	Biomedical Engineering
15	Cell Biology
16	Microbiology
17	Pathology
18	Pharmacology
19	Physiology
25	Other Basic Sciences

Clinical Sciences

Code	Department
30	Anesthesiology
31	Community Health
35	Neurology
36	Family Medicine
37	Obstetrics & Gynecology
38	Pediatrics
39	Psychiatry
40	Radiology
42	Rehab. Med./Physical Med.
50	Medicine
51	Cardiology
52	Dermatology
53	Endocrinology
54	Gastroenterology
55	Hematology
56	Infectious Diseases
57	Pulmonary Diseases
58	Rheumatology
59	Other Medicine
60	Surgery
61	General Surgery
62	Neurosurgery
63	Opthalmology
64	Oral
65	Orthopedic
66	Otolaryngology
67	Plastic
68	Thoracic
69	Urology
70	Other Surgery
0	Institution wide

Illustration 14

Type of Resource

Code	Resource
1	Faculty (full-time)
2	Faculty (part-time)
3	Post doc fellows-basic & clinical
4	Supporting staff
5	Technical-clerical staff
6	Fringe benefits
7	House officers
8	Graduate students
9	Supplies
10	Equipment
11	Library, visual aid
12	Operation and maintenance
13	General administration
14	Contributed services Vol. faculty
15	Physical facilities

Illustration 15

Source of Funds

Code

0100 Series - Restricted to Undergraduate medical education
- 0110 - State Capitation
- 0111 - State funds - restricted
- 0120 - Federal Capitation
- 0121 - Federal training grant - restricted

0200 Series - Restricted to Graduate medical education
- 0200 - General funds administratively restricted
- 0211 - State funds - restricted
- 0221 - Federal training grant - restricted

0300 Series - Restricted to Post-doctoral education
- 0314 - State funds - restricted
- 0320 - Federal training grant - restricted

0400 Series - Restricted to M.S. and Ph.D. education
- 0415 - State funds - restricted
- 0420 - Federal training grant restricted

0500 Series - Restricted to continuing education
- 0510 - State funds
- 0520 - Federal funds
- 0530 - University funds

1600 Series - Restricted to other health education

0700 Series - Restricted to other education

0800 Series - Restricted to education in general
- 0810 - State funds
- 0820 - Federal funds
- 0830 - University funds
- 0840 - Endowment

0900 Series - Restricted to Research
- 0910 - State funds
- 0913 - State reserach grant
- 0920 - Federal funds

1000 Series - Restricted to Patient Care
- 1012 - State funds
- 1025 - Federal funds
- 1050 - Professional fee-practice plan

1100 Series - Restricted to Community Service

Illustration 15 (Con't)

1200 Series - Restricted to Other

1300 Series - Restricted to Administration

1400 Series - Unrestricted funds
1410 - State appropriation

1500 Series - Contributed Services
1510 - Voluntary faculty
1520 - Physical facilities

ILLUSTRATION 16

Card Layout

Type 0.	This is the first card in the deck.		
	cc	1-9	Blank
	cc	10	0 (numeric)
	cc	11-12	Number of Resources
	cc	13-14	Number of source of funds series, 2 more than the number of programs.
	cc	15-16	Number of Medical Education programs (not source of funds series)
	cc	17-18	Lowest code for Basic Science
	cc	19-20	Lowest code for Clinical Science
Type 1.	cc	1-9	Blank
	cc	10	1
	cc	11-14	Resource code or source of funds series code
	cc	15-26	Resource name or source of funds series name
Type 2.	cc	1-2	Department code
	cc	3-4	Resource code
	cc	5-9	Resource identification number
	cc	10	2
	cc	11-14	Blank
	cc	15-22	Total Resource dollars
	cc	23	Input in percent IP1 otherwise blank.
	cc	24-31	Input to program 1
	cc	32-39	Input to program 2
	cc	40-47	Input to program 3
	cc	48-55	Input to program 4
	cc	56-63	Input to program 5
	cc	64-71	Input to program 6
Type 3.	cc	1-9	Same as Type 2
	cc	10	3
	cc	11-23	Blank
	cc	24-31	Input to program 7
	cc	32-39	Input to program 8
	cc	40-47	Input to program 9
	cc	48-55	Input to program 10
	cc	56-63	Input to program 11
	cc	64-71	Input to program 12
Type 4.	cc	1-9	Same as 2 and 3
	cc	10	4
	cc	11-14	Source of funds code
	cc	15	Blank
	cc	16-23	Dollar value of funds
Type 5.	cc	1-10	9999999995

```
C   AAMC SOURCE OF RESOURCE FUNDING STUDY CALCULATION PROGRAM
C
C   THIS PROGRAM IS WRITTEN IN ANSI FORTRAN IV AND SHOULD
C   COMPILE AND RUN WITH NO MODIFICATION ON MOST COMPUTERS.
C
C   AN ATTEMPT WAS MADE TO FOLLOW THE ACCEPTED STRUCTURED
C   PROGRAMMING TECHNIQUES; HOWEVER, FORTRAN IS NOT THE
C   BEST LANGUAGE FOR THIS TYPE OF PROGRAMMING.  THE
C   POINTS TO REMEMBER IN MODIFING THE PROGRAM ARE:
C     1.  DIMENSIONS MUST BE CHANGED IN EVERY SUBROUTINE.
C     2.  THE SUBROUTINES INPUT,OUTPUT,SUMOUT,AND FINAL
C         ALL CONTAIN HARD CODE FOR THE SPECIFIC CARDS
C         TO BE READ OR REPORTS TO BE WRITTEN.
C     3.  THE FORMAT OF THE RECORD LAYOUT WAS CHOSEN TO
C         ALLOW A SORT TO PLACE THE CARDS IN ORDER.
C     4.  THE SUBROUTINE ALLOC IS STRUCTURED AND REQUIRES
C         NO MODIFICATION IF THE NUMBER OF PROGRAMS OR
C         SOURCES OF FUNDS SERIES CHANGES.
C
C   THE TWO IMPORTANT PROGRAMS ARE THE MAIN PROGRAM AND THE
C   SUBROUTINE ALLOC; THEREFORE, A EXPLAINATION OF THEIR
C   LOGIC FOLLOWS.
C
C   BEGIN MAIN PROGRAM
C     READ RUN PARAMETERS AND INITIALIZE ARRAYS AND CONSTANTS
C     READ A RESOURCE CARD
C     DO BEGIN
C        CALL INPUT TO READ REMAINING CARDS FOR RESOURCE N
C        IF DEPT OR RESOURCE TYPE CHANGED PRINT SUMMARY
C        IF DEPT OR RESOURCE CHANGED
C           THEN PRINT SUMMARIES AND UPDATE TOTALS
C           ELSE
C        OUTPUT RESULTS OF ALLOCATION
C        IF LAST READ READ A TYPE 5 CARD
C           THEN LAST-FLAG=1
C           ELSE CALL INPUT
C     UNTIL LAST-FLAG=1
C     WRAPUP FINAL REPORTS
C   END
```

```
C
C  BEGIN SUBROUTINE ALLOCATE
C    IF FUND AND PROGRAM NOT ZERO
C       THEN ALLOCATE MIN TO IALLOC(PROG,FUND)
C            RESIDUAL = ABS(PROG - FUND) TO MAX
C    FOR MED ED PROG AND FUNDS ONLY
C      SUM FUND RESIDUALS, SUM PROG RESIDUALS
C      ICASE = PROG-RES - FUND-RES
C      CASE OF ICASE
C        NEG:  ALLOCATE MED ED PROG-RES ACROSS FUNDS

C        ZERO: ALLOCATE EITHER
C        POS:  ALLOCATE MED ED FUND-RES ACROSS PROG
C      END CASE
C    FOR ALL PROG AND FUNDS
C      SUM FUND RESIDUALS, SUM PROG RESIDUALS
C    ALLOCATE FUNDS ACROSS PROGRAMS
C  END SUBROUTINE ALLOCATE
C
C  VARIABLES OF THE PROGRAM ARE:
C
C    IALLOC(PROG,FUND) WHERE PROG=FUND, THE DIAGONAL
C         FUNDS ARE RESTRICTED TO THAT PROGRAM
C    ITR(PROG+1,FUND+1) RESOURCE SUMMARY
C    IFACEF(PROG)  THE SPREAD OF FACULTY EFFORT
C    IFUND(FUND) THE SPREAD OF FUNDS
C
      DIMENSION IALLOC(14,14),ICOL(15,15),IDEPT(15,15),
     1          ITR(15,15),ITOT(15,16),ILR(15,4),ILS(14,4),
     2          IFACEF(14),IFUND(14),IV(3),IVB(3),FACEF(12)
C
C  CALL PARM TO READ PARAMETERS AND HEADER CARDS TYPE 1.
C
      CALL PARM(NTR,NALL,NMED,IBS,ICS,HREST,
     1          HDEPT,HCOL1,HCOL2,ILR,ILS)
C
C  CALL INIT TO INITIALIZE ARRAYS AND FLAGS TO ZERO.
C
      CALL INIT(ITR,IDEPT,ITOT,IFACEF,IFUND,
     1          IZERO,ILINE,IPAGE,IEOF,ILAST,IERR)
      CALL HEAD(IPAGE,ILINE)
C
C  READ FIRST TYPE TWO CARD INTO BUFFER AS REQUIRED BY INPUT
C
1     READ(5,2) (IV(I),I=1,3),ICARD,ISUF,IDOL,IPERC,
     1          (FACEF(J),J=1,6)
```

```
2     FORMAT(2I2,I5,I1,I4,I8,I1,6F8.0)
      IF(ICARD.EQ.2) GO TO 10
      CALL ERROR(1,IERR)
      GO TO 1
10    CALL INPUT(IFACEF,IFUND,IV,IVB,FACEF,IDOLB,IDOL,
     1          IPERC,ILAST,IEOF,ILINE,IPAGE)
      KDEPT=IVB(1)
      KREST=IVB(2)
      KRESN=IVB(3)
C
C  STATEMENT 1000 BEGINS THE DO-UNTIL GROUP THAT IS EXECUTED
C  FOR ALL RESOURCE SETS, I.E., ALL CARDS BELONGING TO A
C  NUMBERED RESOURCE. STATEMENT 1999 TESTS THE END CONDITION
C
1000  CONTINUE
      CALL ALLOC(NALL,NMED,IFACEF,IFUND,IALLOC)
C
C  TEST FOR CHANGE OF DEPT. IF NOT, RESOURCE TYPE.
C
      IF(KDEPT.EQ.IVB(1)) GO TO 1010
      CALL SUMOUT(ITR,IDEPT,HREST,KREST,NMED,NALL,ILS,IPAGE)
      KREST=IVB(2)
      CALL SUMOUT(IDEPT,ICOL,HDEPT,KDEPT,NMED,NALL,ILS,IPAGE
      KDEPT=IVB(1)
      CALL HEAD(IPAGE,ILINE)
      GO TO 1020
1010  IF(KREST.EQ.IVB(2)) GO TO 1020
      CALL SUMOUT(ITR,IDEPT,HREST,NMED,NALL,ILS,IPAGE)
      KREST=IVB(2)
      CALL HEAD(IPAGE,ILINE)

      GO TO 1020
1020  CALL OUTPUT(IALLOC,NALL,NMED,ILINE,IPAGE,IDOLB,ILS,
     1           IFUND,IFACEF)
      DO 1022 I=1,NALL
      DO 1021 J=1,NALL
1021  ITR(I,J)=ITR(I,J)+IALLOC(I,J)
      ITR(I,15)=ITR(I,15)+IFACEF(I)
1022  ITR(15,I)=ITR(15,I)+IFUND(I)
      ITR(15,15)=ITR(15,15)+IDOLB
      DO 1023 I=1,NALL
      ITOT(I,KREST)=ITOT(I,KREST)+IFACEF(I)
1023  ITOT(I,16)=ITOT(I,16)+IFACEF(I)
      ITOT(15,KREST)=ITOT(15,KREST)+IDOLB
      ITOT(15,16)=ITOT(15,16)+IDOLB
C
      IF(IEOF.EQ.IZERO) GO TO 1030
      ILAST=1
      GO TO 1999
```

```
1030  CALL INPUT(IFACEF,IFUND,IV,IVB,FACEF,IDOLB,IDOL,
     1          IPERC,ILAST,IEOF,ILINE,IPAGE)
      GO TO 1999
1999  IF(ILAST.EQ.IZERO) GO TO 1000
      CALL SUMOUT(ITR,IDEPT,HREST,KREST,NMED,NALL,ILS,IPAGE)
      CALL SUMOUT(IDEPT,ICOL,HDEPT,KDEPT,NMED,NALL,ILS,IPAGE
      IF(IERR.NE.IZERO) GO TO 2000
      CALL FINAL(ICOL,ITOT,NALL,NMED,NTR,IPAGE,ILS,ILR)
      GO TO 3000
2000  WRITE(6,2001) IERR
2001  FORMAT('1',5X,'** RUN STOPPED. THERE WERE ',I4,' ERROR
3000  STOP
      END

      SUBROUTINE ALLOC (NALL,NMED,IFACEF,IFUND,IALLOC)
      DIMENSION IFACEF(14),IFUND(14),IALLOC(14,14),
     1IRESF(14),IRESP(14)
      DO 2001 I=1,NALL
      IRESP(I)=0
      IRESF(I)=0
      DO 2001 J=1,NALL
2001  IALLOC(I,J)=0
C
C  ALLOCATE FUNDS BY PRIMARY RESTRICTION
C
      DO 2050 I=1,NALL
      ICASE=IFACEF(I)-IFUND(I)
      IF(ICASE) 2010,2020,2030
2010  IALLOC(I,I)=IFACEF(I)
      IRESF(I)=-ICASE
      GO TO 2040
2020  IALLOC(I,I)=IFUND(I)
      GO TO 2040
2030  IALLOC(I,I)=IFUND(I)
      IRESP(I)=ICASE
2040  CONTINUE
2050  CONTINUE
C
C
C  SUM MEDICAL EDUCATION RESTRICTED RESIDUALS
C
2100  IMEDP=0
      IMEDF=0
      DO 2110 I=1,NMED
      IMEDP=IMEDP+IRESP(I)
2110  IMEDF=IMEDF+IRESF(I)
C
```

```
C  ALLOCATE MEDICAL EDUCATION RESIDUALS
C
      IF(IMEDF.EQ.0) GO TO 2200
      IF(IMEDP.EQ.0) GO TO 2200
      DO 2115 I=1,NMED
      IF(IRESF(I).NE.0) JL=I
      IF(IRESP(I).NE.0) IL=I
2115  CONTINUE
      ICASE=IMEDP-IMEDF
      IF(ICASE) 2120,2130,2140
C
C  ALLOCATE ALL PROGRAM RESIDUAL OVER
C  FUNDS USING JL TO BALANCE
C
2120  FMED=FLOAT(IMEDF)
      DO 2123 I=1,IL
      ISUM=0
      RATIO=FLOAT(IRESP(I))/FMED
      DO 2122 J=1,JL
      IF(I.EQ.J) GO TO 2122
      IF(J.NE.JL) GO TO 2121
      IALLOC(I,J)=IRESP(I)-ISUM
      GO TO 2122
2121  IALLOC(I,J)=IFIX(RATIO*FLOAT(IRESF(J))+0.5)
      ISUM=ISUM+IALLOC(I,J)
2122  CONTINUE
2123  IRESP(I)=0
      DO 2124 J=1,JL
      DO 2124 I=1,IL
      IF(I.EQ.J) GO TO 2124
      IRESF(J)=IRESF(J)-IALLOC(I,J)
2124  CONTINUE
      GO TO 2200
C
C  ALLOCATE ALL FUND RESIDUAL OVER
C  PROGRAMS USING JL AND IL
C  TO BALANCE
C
2130  FMED=FLOAT(IMEDF)
      JLX=JL-1
      IF(JLX.EQ.0) GO TO 2137
2131  DO 2134 J=1,JLX
      ISUM=0
      RATIO=FLOAT(IRESF(J))/FMED
      DO 2133 I=1,IL
      IF(I.EQ.J) GO TO 2133
      IF(I.NE.IL) GO TO 2132
      IALLOC(I,J)=IRESF(J)-ISUM
      GO TO 2133
```

```
2132  IALLOC(I,J)=IFIX(RATIO*FLOAT(IRESP(I))+0.5)
      ISUM=ISUM+IALLOC(I,J)
2133  CONTINUE
2134  IRESF(J)=0
      DO 2136 I=1,IL
      IF(IRESP(I).EQ.0) GO TO 2136
      ISUM=0
      DO 2135 J=1,JLX
      IF(I.EQ.J) GO TO 2135
      ISUM=ISUM+IALLOC(I,J)
2135  CONTINUE
      IALLOC(I,JL)=IRESP(I)-ISUM
2136  IRESP(I)=0
      IRESF(JL)=0
      GO TO 2139
2137  DO 2138 I=1,IL
      IALLOC(I,JL)=IRESP(I)
2138  IRESP(I)=0
      IRESF(JL)=0
2139  GO TO 2200
C
C  ALLOCATE ALL FUND RESIDUAL OVER
C  PROGRAMS USING IL TO BALANCE
C
2140  FMED=FLOAT(IMEDP)
      DO 2143 J=1,JL
      ISUM=0
      RATIO=FLOAT(IRESF(J))/FMED
      DO 2142 I=1,IL
      IF(I.EQ.J) GO TO 2142
      IF(I.NE.IL) GO TO 2141
      IALLOC(I,J)=IRESF(J)-ISUM
      GO TO 2142
2141  IALLOC(I,J)=IFIX(RATIO*FLOAT(IRESP(I))+0.5)
      ISUM=ISUM+IALLOC(I,J)
2142  CONTINUE
2143  IRESF(J)=0
      DO 2144 J=1,JL
      DO 2144 I=1,IL
      IF(I.EQ.J) GO TO 2144
      IRESP(I)=IRESP(I)-IALLOC(I,J)
2144  CONTINUE
      GO TO 2200
C
C  ALLOCATE ALL REMAINING RESIDUALS
C  RECALL:  SUM PROG RESIDUALS =
C           SUM FUND RESIDUALS
```

```
C
2200  IMEDF=0
      DO 2201 I=1,NALL
      IMEDF=IMEDF+IRESF(I)
      IF(IRESF(I).NE.0) JL=I
      IF(IRESP(I).NE.0) IL=I
2201  CONTINUE
      IF(IMEDF.EQ.0) GO TO 2300
      JLX=JL-1
      IF(JLX.EQ.0) GO TO 2210
      FMED=FLOAT(IMEDF)
      DO 2205 J=1,JLX
      IF(IRESF(J).EQ.0) GO TO 2205
      ISUM=0
      RATIO=FLOAT(IRESF(J))/FMED
      DO 2204 I=1,IL
      IF(IRESP(I).EQ.0) GO TO 2204
      IF(IALLOC(I,J).NE.0) GO TO 2204
      IF(I.NE.IL) GO TO 2203
      IALLOC(I,J)=IRESF(J)-ISUM
      GO TO 2204
2203  IALLOC(I,J)=IFIX(RATIO*FLOAT(IRESP(I))+0.5)
      ISUM=ISUM+IALLOC(I,J)
2204  CONTINUE
2205  IRESF(J)=0
      DO 2207 I=1,IL
      IF(IRESP(I).EQ.0) GO TO 2207
      ISUM=0
      DO 2206 J=1,JLX
      ISUM=ISUM+IALLOC(I,J)
2206  CONTINUE
      IALLOC(I,JL)=IFACEF(I)-ISUM
2207  IRESP(I)=0
      IRESF(JL)=0
      GO TO 2220
2210  DO 2211 I=1,IL
      IALLOC(I,JL)=IRESP(I)
2211  IRESP(I)=0
      IRESF(JL)=0
2220  GO TO 2300
2300  RETURN
      END
      SUBROUTINE INPUT(IFACEF,IFUND,IV,IV3,FACEF,IDOLE,IDOL
     1,IPERC,ILAST,IEOF,ND,NI,NN)
      DIMENSION IFACEF(14),IFUND(14),IV(3),IV5(3),FACEF(12)
C  TYPE 2 CARD SHOULD BE IN INPUT BUFFER
      DO 1 I=1,3
1     IV5(I)=IV(I)
      DO 2 I=1,14
```

```
      IFUND(I)=0
2     IFACEF(I)=0
      IDOLB=IDOL
      ICONV=IPERC
10    READ(5,11,END=99) (IV(I),I=1,3),ICARD,ISOF,
     1IDOL,IPERC,(FACEF(J),J=7,12)
11    FORMAT(212,15,11,14,16,11,6F8.0)
      IF(ICARD.EQ.3) GO TO 15
      CALL ERROR(2,IERR)
      WRITE(5,12) IV,ICARD,ISOF,IDOL
12    FORMAT(/,2X,'***CARD IN ERROR***',2X,212,15,11,14,19)
      GO TO 99
15    IF(ICONV.EQ.0) GO TO 20
      FSUM=0
      DO 150 I=1,12
150   FSUM=FSUM+FACEF(I)
      DO 151 I=1,12
151   FACEF(I)=FACEF(I)/FSUM
      DO 16 I=1,12
16    FACEF(I)=(FLOAT(IDOLB)*FACEF(I)) /100.0 + 0.1
      ICONV=0
20    ISUM=0
      DO 21 I=1,7
      IFACEF(I)=IFIX(FACEF(I))
21    ISUM=ISUM+IFACEF(I)
      DO 22 I=8,12
      IJ=I+1
      IFACEF(IJ)=IFIX(FACEF(I))
22    ISUM=ISUM+IFACEF(IJ)
      WRITE(6,23) IV(1),IV(2),IDOLB,(IFACEF(I),I=1,7)
     1 ,(IFACEF(I),I=8,13)
23    FORMAT(/,2X,I2,2X,I2,1X,'EFFORT',2X,19,1213)
C  DO UNTIL A NON-TYPE 4 CARD IS READ
30    READ(5,11,END=99)(IV(I),I=1,3),ICARD,ISOF,
     1 IDOL,IPERC,(FACEF(J),J=1,6)
      IF(ICARD.EQ.2) GO TO 2000
      IF(ICARD.EQ.5) GO TO 1000
      ISOFS=ISOF/100
      IFUND(ISOFS)=IDOL
      WRITE(6,31) IV(3),ISOF,IDOL
31    FORMAT(2X,I5,2X,I4,4X,I9)
      GO TO 30
99    CONTINUE
1000  IEOF=1
2000  RETURN
      END
```

```
      SUBROUTINE SUMOUT(J1,J2,H3,J4,NMED,NALL,ILS,IPAGE)
      DIMENSION J1(15,15),J2(15,15),ILS(14,4)
      IPAGE=IPAGE+1
      WRITE(6,1) IPAGE,H3,J4
1     FORMAT('1',///////,120X,'PAGE',I5,//,25X,
     1'AAMC STUDY OF RESOURCES & FINANCING OF MEDICAL SCHOOL
     2,/,46X,'SUMMARY OF ',A4,I4)
      WRITE(6,10)
10    FORMAT(//,29X,'UNDER    GRAD    POST    M.S.    CONT
     1,'OTHER   OTHER          PATIENT    COMM')
      WRITE(6,11)
11    FORMAT(21X,'TOTAL   -GRAD    M.D.     DOC   PH.D.   ED
     1,'HEALTH   EDUC.  RESRCH    CARE   SERV.   OTHER   ADM
      IL=NALL+1
      IMED=NMED+1
      JMED=NMED-1
      IALL=NALL-1
      WRITE(6,2) J1(IL,IL),(J1(I,IL),I=1,JMED),
     1  (J1(I,IL),I=IMED,IALL)
2     FORMAT(/,3X,'TOTAL EFFORT',2X,I9,12I8)
      DO 4 J=1,NALL
      IF(J1(IL,J).EQ.0) GO TO 4
      WRITE(6,3) (ILS(J,I),I=1,3),J1(IL,J),(J1(I,J),I=1,JMED
     1  (J1(I,J),I=IMED,IALL)
3     FORMAT(/,3X,3A4,2X,I9,12I8)
4     CONTINUE
      DO 5 I=1,IL
      DO 5 J=1,IL
      J2(I,J)=J2(I,J)+J1(I,J)
5     J1(I,J)=0
      RETURN
      END
      SUBROUTINE OUTPUT(IALLOC,NALL,NMED,ILINE,IPAGE,IDOLB,I
     1 IFUND,IFACEF)
      DIMENSION IALLOC(14,14),ILS(14,4),IFUND(14),IFACEF(14)
      IL=NALL+1
      IMED=NMED+1
      JMED=NMED-1
      IALL=NALL-1
      ILINE=ILINE+2
      IF(ILINE.LT.80) GO TO 1
      CALL HEAD(IPAGE,ILINE)
      ILINE=0
1     WRITE(6,2) IDOLB,(IFACEF(I),I=1,JMED)
     1 ,(IFACEF(I),I=IMED,IALL)
2     FORMAT(' ',2X,'TOTAL EFFORT',2X,I9,12I8)
      DO 4 J=1,NALL
      IF(IFUND(J).EQ.0) GO TO 4
      WRITE(6,3) (ILS(J,I),I=1,3),IFUND(J),
```

```
     1  (IALLOC(I,J),I=1,JMED),(IALLOC(I,J),I=IMED,IALL)
3     FORMAT(' ',2X,3A4,2X,I9,12I8)
      ILINE=ILINE+1
      IF(ILINE.LT.80) GO TO 4
      CALL HEAD(IPAGE,ILINE)
4     CONTINUE
      RETURN
      END
      SUBROUTINE HEAD(IPAGE,ILINE)
      ILINE=1
      IPAGE=IPAGE+1
      WRITE(6,1) IPAGE
1     FORMAT('1',//////,50X,'AAMC STUDY',50X,'PAGE',I5)
      WRITE(6,2)
2     FORMAT(29X,'UNDER    GRAD    POST    M.S.    CONT
     1,'OTHER   OTHER          PATIENT    COMM')
      WRITE(6,3)
3     FORMAT(21X,
     1'TOTAL   -GRAD    M.D.     DOC   PH.D.   EDUC.  HEALTH
     2'EDUC.  RESRCH    CARE   SERV.   OTHER   ADMIN')
      RETURN
      END
      SUBROUTINE INIT(ITR,IDEPT,ITOT,IFACEF,IFUND
     1 ,IZERO,ILINE,IPAGE,IEOF,ILAST,IERR)
      DIMENSION ITR(15,15),IDEPT(15,15),ITOT(15,16),
     1 IFACEF(14),IFUND(14)
      DO 1 I=1,14
      IFACEF(I)=0
1     IFUND(I)=0
      DO 3 I=1,15
      DO 2 J=1,15
      ITR(I,J)=0
      IDEPT(I,J)=0
2     ITOT(I,J)=0
3     ITOT(I,16)=0
      IZERO=0
      ILINE=0
      IPAGE=0
      IEOF=0
      ILAST=0
      IERR=0
      RETURN
      END
      SUBROUTINE PARM(NTR,NALL,NMED,IBS,ICS,HREST,
     1          HDEPT,HCOL1,HCOL2,ILR,ILS)
      DIMENSION ILR(15,4),ILS(14,4)
      READ(5,1) ICARD,NTR,NALL,NMED,IBS,ICS,
     1          HREST,HDEPT,HCOL1,HCOL2
1     FORMAT(9X,I1,5I2,4A4)
```

```
      DO 2 I=1,NTR
2     READ(5,3) ICARD,(ILR(I,J),J=1,4)
3     FORMAT(9X,I1,4X,4A4)
      DO 4 I=1,NALL
4     READ(5,5) ICARD,(ILS(I,J),J=1,4)
5     FORMAT(9X,I1,4X,4A4)
      RETURN
      END
      SUBROUTINE ERROR(ITYPE,IERR)
      IERR=IERR+1
      RETURN
      END
      SUBROUTINE FINAL(ICOL,ITOT,NALL,NMED,NTR,IPAGE,ILS,ILR
      DIMENSION ICOL(15,15),ITOT(15,16),ILS(14,4),ILR(15,4),
     1          PERC1(15,16)
      CALL HEAD(IPAGE,ILINE)
      WRITE(6,1) ITOT(15,16),(ITOT(I,16),I=1,7),
     1          (ITOT(I,16),I=9,13)
1     FORMAT(/,2X,'TOTALS',8X,I9,12I8)
      DO 3 J=1,NTR
      WRITE(6,2) (ILR(J,I),I=1,3),ITOT(15,J),
     1          (ITOT(I,J),I=1,7),(ITOT(I,J),I=9,13)
2     FORMAT(/,2X,3A4,2X,I9,12I8)
3     CONTINUE
      DO 10 I=1,15
      DO 10 J=1,16
10    PERC1(I,J)=0.0
      PD=FLOAT(ITOT(15,16))
      DO 11 I=1,15
      DO 11 J=1,16
      IF(ITOT(I,J).EQ.IZERO) GO TO 11
      PERC1(I,J)=(FLOAT(ITOT(I,J))/PD)*100 + 0.001
11    CONTINUE
      CALL HEAD(IPAGE,ILINE)
      WRITE(6,12) PERC1(15,16),(PERC1(I,16),I=1,7),
     1          (PERC1(I,16),I=9,13)
12    FORMAT(/,2X,'ALL RESOURCE',2X,F9.2,12F8.2)
      DO 14 J=1,NTR
      IF(ITOT(15,J).EQ.IZERO) GO TO 14
      WRITE(6,13) (ILR(J,I),I=1,3),PERC1(15,J),
     1          (PERC1(I,J),I=1,7),(PERC1(I,J),I=9,13)
13    FORMAT(/,2X,3A4,2X,F9.2,12F8.2)
14    CONTINUE
      DO 20 I=1,15
      DO 20 J=1,16
20    PERC1(I,J)=0.0
      DO 21 I=1,15
      IF(ITOT(I,16).EQ.0) GO TO 21
      PD=FLOAT(ITOT(I,16))
```

```
      DO 21 J=1,16
      IF(ITOT(I,J).EQ.0) GO TO 21
      PERC1(I,J)=(FLOAT(ITOT(I,J))/PD)*100.0 + 0.001
21    CONTINUE
      CALL HEAD(IPAGE,ILINE)
      WRITE(6,22) PERC1(15,16),(PERC1(I,16),I=1,7),
     1         (PERC1(I,16),I=9,13)
22    FORMAT(/,2X,'ALL RESOURCE',2X,F9.2,12F8.2)
      DO 24 J=1,NTR
      WRITE(6,23) (ILR(J,I),I=1,3),PERC1(15,J),
     1          (PERC1(I,J),I=1,7),(PERC1(I,J),I=9,13)
23    FORMAT(/,2X,3A4,2X,F9.2,12F8.2)
24    CONTINUE
      DO 30 I=1,15
      DO 30 J=1,16
30    PERC1(I,J)=0.0
      DO 31 J=1,16
      IF(ITOT(15,J).EQ.0) GO TO 31
      PD=FLOAT(ITOT(15,J))
      DO 31 I=1,15
      IF(ITOT(I,J).EQ.0) GO TO 31
      PERC1(I,J)=(FLOAT(ITOT(I,J))/PD)*100.0 + 0.001
31    CONTINUE
      CALL HEAD(IPAGE,ILINE)
      WRITE(6,32) PERC1(15,16),(PERC1(I,16),I=1,7),
     1         (PERC1(I,16),I=9,13)
32    FORMAT(/,2X,'ALL RESOURCE',2X,F9.2,12F8.2)
      DO 34 J=1,NTR
      WRITE(6,33) (ILR(J,I),I=1,3),PERC1(15,J),
     1          (PERC1(I,J),I=1,7),(PERC1(I,J),I=9,13)
33    FORMAT(/,2X,3A4,2X,F9.2,12F8.2)
34    CONTINUE
      RETURN
      END
```

Illustration 17

TEST DATA

Department 0; Resource 4

Identification Number (ID)1	
Effort:	
Administration	$50,000
Source of Funds:	
- Code 1410 - State Appropriation	$50,000
ID #2	
Effort:	
Undergraduate Medical Education	$10,000
Source of funds:	
- Code 0820 - General Education Federal	$ 5,000
- Code 1410 - State Appropriation	$ 5,000

Department 17; Resource 1

ID #3	
Effort:	
25% Undergraduate Medical Education	
50% Graduate Medical Education	
25% Research	
Source of Funds:	
- Code 0320 - Post doctoral training grant-Federal	$ 5,000
- Code 0911 - Research grant - State	$ 5,000
- Code 1400 - General Funds	$10,000
ID #4	
Effort:	
Undergraduate Medical Education	$10,000
Patient Care	$10,000
Source of funds:	
- Code 1050 - Patient services	$10,000
- Code 0110 - Capitation - State	$10,000
ID #5	
Effort:	
Post doctoral education	$ 5,000
M.S. - Ph.D. Education	$10,000
Research	$30,000
Patient Care	$ 5,000
Source of funds:	
- Code 0920 - Research grant - Federal	$40,000

Illustration 17 (Con't)

- Code	0110 - Capitation - State	$ 2,000
- Code	1012 - Patient services - State	$ 6,000
- Code	0314 - Post doctoral training grant-Federal	$ 2,000

ID #6

	Effort:	
	Undergraduate medical education	$10,000
	Continuing medical education	$ 5,000
	Research	$12,000
	Patient care	$ 2,500
	Community service	$ 6,000
	Other	$ 4,500
	Source of funds:	
- Code	0120 - Federal capitation	$20,000
- Code	0913 - Research grant - State	$15,000
- Code	1400 - General funds	$ 5,000

ID #7

	Effort:	
	Undergraduate medical education	$ 5,000
	Graduate medical education	$ 8,000
	Post doctoral education	$ 2,000
	M.S. - Ph.D. education	$ 5,000
	Other health education	$ 7,000
	Research	$10,000
	Patient care	$18,000
	Community service	$ 3,000
	Other	$ 2,000
	Source of funds:	
- Code	0120 - Federal capitation	$10,000
- Code	0314 - Post doctoral training grant-State	$ 2,000
- Code	0415 - M.D. - Ph.D. training grant-State	$ 8,000
- Code	0221 - Graduate medical education training grant - Federal	$10,000
- Code	1025 - Patient Services - Federal	$25,000
- Code	0913 - Research grant - State	$ 5,000

ID #8

	Effort:	
	Graduate medical education	$20,000
	Continuing medical education	$ 5,000
	Other health education	$ 2,500
	Patient care	$10,000
	Community public services	$ 2,500

Illustration 17 (Con't)

Source of funds:

- Code 0200 -	General funds - administratively restricted for support of graduate medical education	$10,000
- Code 1025 -	Patient services - Federal	$20,000
- Code 1400 -	General funds	$10,000

```
**********THIS IS THE DATA FOR THE TEST PROBLEM ********

          01514081030RES DEPTCOLLEGE
          10001FACULTY-FULL    1
          10002FACULTY-PART    2
          10003POST DOC FEL    3
          10004SUPPORT STAF    4
          10005TECH-CL STAF    5
          10006FRINGE BENEF    6
          10007HOUSE STAFF     7
          10008GRAD STUDENT    8
          10009SUPPLIES        9
          10010EQUIPMENT      10
          10011LIBRARY        11
          10012POM            12
          10013GEN ADMIN      13
          10014VOL FACULTY    14
          10015PHYSICAL  FC   15
          10100UNDER-GRAD E    1
          10200GRAD MED ED     2
          10300POST DOC ED     3
          10400MS PHD ED       4
          10500CONT MED ED     5
          10600OTHER HL ED     6
          10700OTHER ED        7
          10800RESTRICTED      8
          10900RESEARCH        9
          11000PATIENT CARE   10
          11000COMM SERVICE   11
          11200OTHER          12
          11300ADMIN          13
          11400UNRESTRICTED   14
0004000012        50000
0004000013
0004000014141Ø    50000
0004000022        10000     10000
0004000023
0004000024082Ø     5000
0004000024141Ø     5000
17010000032       200001    25.00    50.00
17010000033                           25.00
17010000340320     5000
17010000340911     5000
17010000341400    10000
17010000042       20000     10000
17010000043                                    10000
17010000440110    10000
17010000441050    10000
```

```
1701000052        50000                          5000    10000
1701000053                            30000      5000
17010000540110     2000
17010000540314     2000
17010000540920    40000
17010000541012     6000
1701000062        40000     10000                          5000
1701000063                            12000      2500     6000     4
17010000640120    20000
17010000640913    15000
17010000641400     5000
1701000072        60000      5000      8000      2000     5000
1701000073                            10000     18000     3000     2
17010000740120    10000
17010000740221    10000
17010000740314     2000
17010000740415     8000
17010000740913     5000
17010000741025    25000
1701000082        40000                20000                        5
1701000083                                      10000     2500
17010000840200    10000
17010000841025    20000
17010000841400    10000
9999999995
```

COMPUTER REPORT - TEST DATA

AAMC STUDY

	TOTAL	UNDER -GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	OTHER	ADMIN
0 4 EFFORT	50000	0	0	0	0	0	0	0	0	0	0	0	50000
1 1410	50000												
TOTAL EFFORT	50000	0	0	0	0	0	0	0	0	0	0	0	50000
UNRESTRICTED	50000	0	0	0	0	0	0	0	0	0	0	0	50000
0 4 EFFORT	10000	10000	0	0	0	0	0	0	0	0	0	0	0
2 820	5000												
2 1410	5000												
TOTAL EFFORT	10000	10000	0	0	0	0	0	0	0	0	0	0	0
RESTRICTED	5000	5000	0	0	0	0	0	0	0	0	0	0	0
UNRESTRICTED	5000	5000	0	0	0	0	0	0	0	0	0	0	0
17 1 EFFORT	20000	5000	10000	0	0	0	0	0	5000	0	0	0	0
3 320	5000												
3 911	5000												
3 1400	10000												

AAMC STUDY OF RESOURCES & FINANCING OF MEDICAL SCHOOL PROGRAMS
SUMMARY OF RES 4

	TOTAL	UNDER -GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	OTHER	ADMIN
TOTAL EFFORT	60000	10000	0	0	0	0	0	0	0	0	0	0	50000
RESTRICTED	5000	5000	0	0	0	0	0	0	0	0	0	0	0
UNRESTRICTED	55000	5000	0	0	0	0	0	0	0	0	0	0	50000

AAMC STUDY OF RESOURCES & FINANCING OF MEDICAL SCHOOL PROGRAMS
SUMMARY OF DEPT 0

	TOTAL	UNDER -GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	OTHER	ADMIN
TOTAL EFFORT	60000	10000	0	0	0	0	0	0	0	0	0	0	50000
RESTRICTED	5000	5000	0	0	0	0	0	0	0	0	0	0	0
UNRESTRICTED	55000	5000	0	0	0	0	0	0	0	0	0	0	50000

	TOTAL	UNDER -GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	OTHER	ADMIN
TOTAL EFFORT	20000	5000	10000	0	0	0	0	0	5000	0	0	0	0
POST DOC ED	5000	1667	3333	0	0	0	0	0	0	0	0	0	0
RESEARCH	5000	0	0	0	0	0	0	0	5000	0	0	0	0
UNRESTRICTED	10000	3333	6667	0	0	0	0	0	0	0	0	0	0
17 1 EFFORT	20000	10000	0	0	0	0	0	0	0	10000	0	0	0
4 110	10000												
4 1050	10000												
TOTAL EFFORT	20000	10000	0	0	0	0	0	0	0	10000	0	0	0
UNDER-GRAD E	10000	10000	0	0	0	0	0	0	0	0	0	0	0
PATIENT CARE	10000	0	0	0	0	0	0	0	0	10000	0	0	0
17 1 EFFORT	50000	0	0	5000	10000	0	0		30000	5000	0	0	0
5 110	2000												
5 314	2000												
5 920	40000												
5 1012	6000												
TOTAL EFFORT	50000	0	0	5000	10000	0	0	0	30000	5000	0	0	0
UNDER-GRAD E	2000	0	0	462	1538	0	0	0	0	0	0	0	0
POST DOC ED	2000	0	0	2000	0	0	0	0	0	0	0	0	0
RESEARCH	40000	0	0	2307	7693	0	0	0	30000	0	0	0	0
PATIENT CARE	6000	0	0	231	769	0	0	0	0	5000	0	0	0
17 1 EFFORT	40000	10000	0	0	5000	0	0	0	12000	2500	6000	4500	0
6 120	20000												
6 913	15000												
6 1400	5000												
TOTAL EFFORT	40000	10000	0	0	5000	0	0	0	12000	2500	6000	4500	0
UNDER-GRAD E	20000	10000	0	0	5000	0	0	0	0	962	2308	1730	0
RESEARCH	15000	0	0	0	0	0	0	0	12000	577	1385	1038	0
UNRESTRICTED	5000	0	0	0	0	0	0	0	0	961	2307	1732	0

17 1 EFFORT	60000	5000	8000	2000	5000	0	7000	0	10000	18000	3000	2000	0
7 120	10000												
7 221	10000												
7 314	2000												
7 0415	8000												
7 913	5000												
7 1025	25000												
TOTAL EFFORT	60000	5000	8000	2000	5000	0	7000	0	10000	18000	3000	2000	0
UNDER-GRAD E	10000	5000	0	0	0	0	3500	0	750	0	450	300	0
GRAD MED ED	10000	0	8000	0	0	0	1400	0	300	0	180	120	0
POST DOC ED	2000	0	0	2000	0	0	0	0	0	0	0	0	0
MS PHD ED	8000	0	0	0	5000	0	2100	0	450	0	270	180	0
RESEARCH	5000	0	0	0	0	0	0	0	5000	0	0	0	0
PATIENT CARE	25000	0	0	0	0	0	0	0	3500	18000	2100	1400	0
17 1 EFFORT	40000	0	20000	0	0	5000	2500	0	0	10000	2500	0	0
8 200	10000												
8 1025	20000												
8 1400	10000												
TOTAL EFFORT	40000	0	20000	0	0	5000	2500	0	0	10000	2500	0	0
GRAD MED ED	10000	0	10000	0	0	0	0	0	0	0	0	0	0
PATIENT CARE	20000	0	5000	0	0	2500	1250	0	0	10000	1250	0	0
UNRESTRICTED	10000	0	5000	0	0	2500	1250	0	0	0	1250	0	0

AAMC STUDY OF RESOURCES & FINANCING OF MEDICAL SCHOOL PROGRAMS
SUMMARY OF RES 1

	TOTAL	UNDER -GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	OTHER	ADMIN
TOTAL EFFORT	230000	30000	3[illegible]000	7000	20000	5000	9500	0	57000	45500	11500	6500	0
UNDER-GRADE E	42000	25000	0	462	6538	0	3500	0	750	962	2758	2030	0
GRAD MED ED	20000	0	18000	0	0	0	1400	0	300	0	180	120	0
POST DOC ED	9000	1667	3333	4000	0	0	0	0	0	0	0	0	0
MS PHD ED	8000	0	0	0	5000	0	2100	0	450	0	270	180	0
RESEARCH	65000	0	0	2307	7693	0	0	0	52000	577	1385	1038	0
PATIENT CARE	61000	0	5000	231	769	2500	1250	0	3500	43000	3350	1400	0
UNRESTRICTED	25000	3333	11667	0	0	2500	1250	0	0	961	3557	1732	0

AAMC STUDY OF RESOURCES & FINANCING OF MEDICAL SCHOOL PROGRAMS
SUMMARY OF DEPT 17

	TOTAL	UNDER -GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	OTHER	ADMIN
TOTAL EFFORT	230000	30000	38000	7000	20000	5000	9500	0	57000	45500	11500	6500	0
UNDER-GRAD E	42000	25000	0	462	6538	0	3500	0	750	962	2758	2030	0
GRAD MED ED	20000	0	18000	0	0	0	1400	0	300	0	180	120	0
POST DOC ED	9000	1667	3333	4000	0	0	0	0	0	0	0	0	0
MS PHD ED	8000	0	0	0	5000	0	2100	0	450	0	270	180	0
RESEARCH	65000	0	0	2307	7693	0	0	0	52000	577	1385	1038	0
PATIENT CARE	61000	0	5000	231	769	2500	1250	0	3500	43000	3350	1400	0
UNRESTRICTED	25000	3333	11667	0	0	2500	1250	0	0	961	3557	1732	0

AAMC STUDY

	TOTAL	UNDER -GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	OTHER	ADMIN
TOTALS	290000	40000	38000	7000	20000	5000	9500	0	57000	45500	11500	6500	50000
FACULTY-FULL	230000	30000	38000	7000	20000	5000	9500	0	57000	45500	11500	6500	0
FACULTY-PART	0	0	0	0	0	0	0	0	0	0	0	0	0
POST DOC FEL	0	0	0	0	0	0	0	0	0	0	0	0	0
SUPPORT STAF	60000	10000	0	0	0	0	0	0	0	0	0	0	50000
TECH-CL STAF	0	0	0	0	0	0	0	0	0	0	0	0	0
FRINGE BENEF	0	0	0	0	0	0	0	0	0	0	0	0	0
HOUSE STAFF	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAD STUDENT	0	0	0	0	0	0	0	0	0	0	0	0	0
SUPPLIES	0	0	0	0	0	0	0	0	0	0	0	0	0
EQUIPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0
LIBRARY	0	0	0	0	0	0	0	0	0	0	0	0	0
POM	0	0	0	0	0	0	0	0	0	0	0	0	0
GEN ADMIN	0	0	0	0	0	0	0	0	0	0	0	0	0
VOL FACULTY	0	0	0	0	0	0	0	0	0	0	0	0	0
PHYSICAL FC	0	0	0	0	0	0	0	0	0	0	0	0	0

AAMC STUDY

	TOTAL	UNDER-GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	PAGE OTHER	8 ADMIN
ALL RESOURCE	100.00	13.79	13.10	2.41	6.90	1.73	3.28	0.00	19.66	15.69	3.97	2.24	17.24
FACULTY-FULL	79.31	10.35	13.10	2.41	6.90	1.73	3.28	0.00	19.66	15.69	3.97	2.24	0.00
FACULTY-PART	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POST DOC FEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUPPORT STAF	20.69	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.24
TECH-CL STAF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FRINGE BENEF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HOUSE STAFF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRAD STUDENT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUPPLIES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EQUIPMENT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LIBRARY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GEN ADMIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VOL FACULTY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PHYSICAL FC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AAMC STUDY

	TOTAL	UNDER -GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	PAGE OTHER	9 ADMIN
ALL RESOURCE	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.0	100.00	100.00	100.00	100.00	100.00
FACULTY-FULL	79.31	75.00	100.00	100.00	100.00	100.00	100.00	0.0	100.00	100.00	100.00	100.00	0.0
FACULTY-PART	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
POST DOC FEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUPPORT STAF	20.69	25.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.00
TECH-CL STAF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FRINGE BENEF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HOUSE STAFF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRAD STUDENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUPPLIES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EQUIPMENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIBRARY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GEN ADMIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOL FACULTY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PHYSICAL FC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

AAMC STUDY

	TOTAL	UNDER -GRAD	GRAD M.D.	POST DOC	M.S. PH.D.	CONT EDUC.	OTHER HEALTH	OTHER EDUC.	RESRCH	PATIENT CARE	COMM SERV.	PAGE OTHER	10 ADMIN
ALL RESOURCE	100.00	13.79	13.10	2.41	6.90	1.73	3.28	0.0	19.66	15.69	3.97	2.24	17.24
FACULTY-FULL	100.00	13.04	16.52	3.04	8.70	2.17	4.13	0.0	24.78	19.78	5.00	2.83	0.0
FACULTY-PART	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
POST DOC FEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUPPORT STAF	100.00	16.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.33
TECH-CL STAF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FRINGE BENEF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HOUSE STAFF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRAD STUDENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUPPLIES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EQUIPMENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIBRARY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
POM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GEN ADMIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOL FACULTY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PHYSICAL FC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COVERAGE AND CONCEPTUAL DIFFICULTIES

Study scope. An investigation into the programs and activities structure of so complex an institution as the contemporary medical school requires fixing the limits -- organization, activity, program -that will bound the study.

This is particularly crucial where the results are to be used not only by management for more precise institutional self-analysis, but also for comparative studies among institutions, and for aggregations of the results to depict the situation for all medical schools conducting such studies.

At this stage of its development, the proposed methodology covers the activities of organizational units other than the medical school only to the extent that these other units provide resources for the medical school programs listed in the DEFINITIONS section of this Manual.

Limiting the study in this way may be difficult to achieve where a medical school's organizational structure includes a hospital, clinic, or other patient care facility. In order to make comparisons among institutions, however, this should be the goal, since for many medical schools patient care activities are separately organized and governed.

The objective of presenting a detailed procedure as clearly as possible necessitated limiting the scope of this publication to activities of medical schools. The cost-finding approach proposed in this Manual, however, can also be applied to the activities of other educational institutions - health professions and others. Obviously, program designations would have to reflect those of the institutions studied, but the resource inputs and fund sources would be similar to those for medical educational schools.

CONCEPTUAL PROBLEMS

Joint-product. The allocation of a resource input and the accompanying income flow to one program where the simultaneous utilization of the resource is also an input to another program presents particular difficulties for

cost-finding and resource-funding analyses for medical schools, since

> "It is recognized that a faculty member can be involved in the functions of teaching, research and service all at the same time. By this we mean that a physician can be making rounds of his patients in the hospital at the same time he can be discussing the care of these patients with medical students, interns and residents. In addition, some portion of this care could have implications for the research which this physician is carrying on. It is exactly this type of environment which has developed the practice of medicine in the university health centers of this country to its high level of performance. Therefore, it is imperative that the measurement of interdependent programs be accomplished within reasonable limits".[6]

Some resolution of the joint-use of resources is essential. Suggested procedures for deriving measures of inter-dependence among programs are presented in Chapters 3 and 4 of the published Guidelines for cost-allocation studies.

Once these determinations have been made for the cost-finding phase, using the suggested procedures in the published Guidelines, or some other approach, the linkage of resource inputs with sources of funds can be accomplished simply by following the proposed resource-funding methodology.

Possible Misinterpretations. By design, the resource-funding study presents a view of an institution where funds are adequate to acquire the resources utilized in carrying forward the school's activities. This, however, may be a misleading indication of the fiscal situation at an institution. The balance between funds and resource needs may have been achieved only through use of endowment principal, or through borrowing, or emergency assistance may have been provided by the parent university, or by a state legislature, or a Federal financial distress grant may, temporarily, have helped make ends meet. Additional analytical memoranda are necessary, therefore, to provide this additional information, to allay incorrect interpretations. For instance, funds provided through such "temporary" assistance may be commingled with other funds and be

included in the general funds category. As a result, it may not be possible to identify the specific resource input and program funded by the "temporary" assistance. A memorandum showing the sources of funds making up the general funds category may clarify the situation by showing that the balance between funds and resource needs was made possible only by the special assistance funds included in the general funds category.

Finally, the study does not set standards for the "proper" amount, kind, or utilization of resources to achieve normative goals or objectives for all medical education.

The study does provide a view of an institution's on-going operations, at a <u>given point in time</u>. A view that may help in the decision-making process by providing another dimension for an evaluation and understanding of the financing mechanisms upon which the individual institution has relied to acquire the requisite resources. Aggregate information for all medical schools might then provide a view of the financing mechanisms for the entire medical education universe.